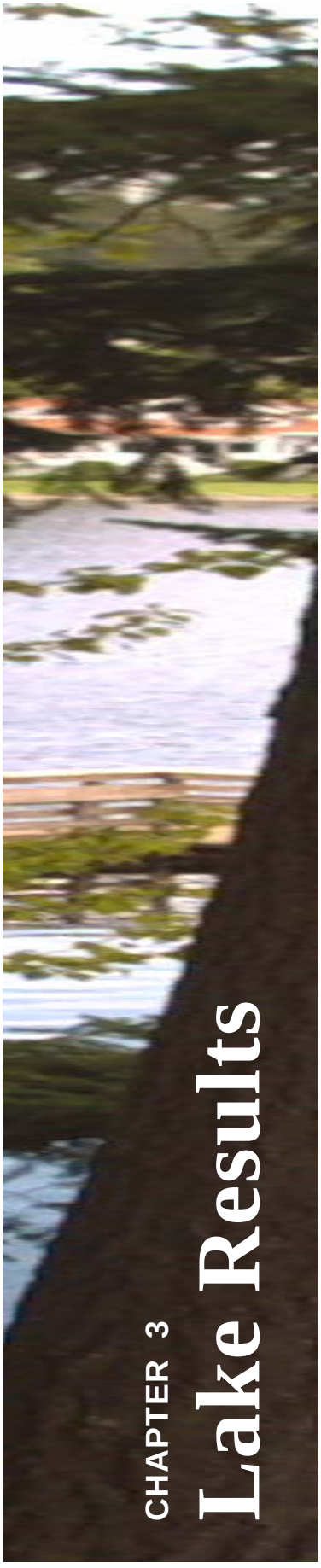


CHAPTER 3

Lake Results

Introduction

From October 1, 2001 to September 30, 2002 volunteers monitored 50 lakes throughout King County (Table 3-1). The results of their work are reported in this chapter for each lake that was monitored, in alphabetical order. There are two exceptions — for which volunteers collected only Level I data — Easter Lake and Lake Sammamish, which appear at the end of the chapter due to report formatting. Five volunteer monitors measured Level I parameters at different Lake Sammamish locations and the data is included in this report. The data summary can be found on the final page of this chapter. Individual station data are summarized in Appendix A.

Watershed and lake morphology data are summarized for each lake (Table 3-2). A map showing each lake's placement within its watershed has replaced lake bathymetric maps used in previous reports. The bathymetric maps can be found in Appendix C.

Level I data such as precipitation, water level, Secchi transparency, and surface temperature are presented as line plots over the water year. Precipitation events are plotted as bars on the same chart for direct comparisons between large-scale rainfall and short-term increases in water level. Level I and Level II measurements of Secchi depth and temperature are plotted in the same charts, but have different symbols.

Level II chemistry data, including chlorophyll *a*, total phosphorus, and total nitrogen, are plotted by date throughout the sampling season. Nitrogen and phosphorus are plotted on the same chart, but with different scales, to show their relationships. There were two dates on which profile data was collected. These data are presented in Chapter 5 as part of the general discussion and synthesis (Table 5-1).

Phytoplankton are plotted by cumulative biovolumes of four major groups. The topmost line in each chart represents the total biovolume present for a given sample date. Further discussion of the different groups of algae and their general significance in the phytoplankton is presented in Chapter 4.

Table 3-1: Volunteer Monitored Lakes and Level of Participation in 2002

LAKE	LEVEL I				LEVEL I				LEVEL II
	Weekly				Daily				Biweekly
	1st qtr	*2nd qtr*	*3rd qtr*	*4th qtr*	*1st qtr*	*2nd qtr*	*3rd qtr*	*4th qtr*	*(May - Oct. 2001)*
Alice					X	X			X
Allen	X								X
Ames	X	X	X	X	X	X		X	X
Angle	X	X	X	X	X	X			X
Beaver 1									X
Beaver 2	X	X	X	X	X	X	X	X	X
Bitter									X
Boren	X	X	X	X	X	X	X	X	X
Burien									X
Cottage	X	X	X	X	X	X	X	X	X
Desire	X	X	X	X	X	X	X	X	X
Easter					X	X	X	X	
Fenwick									3 dates
Fivemile									X
Francis	X	X	X		X	X	X	X	X
Geneva	X	X	X	X	X	X	X	X	X
Grass			X	X			X	X	X
Haller	X	X	X	X	X	X	X	X	X
Horseshoe									X
Jones									X
Joy				X				X	X
Kathleen	X	X			X	X		X	X
Killarney			X	X			X	X	X
Langlois	X		X	X	X	X	X	X	X
Leota	X	X	X	X	X	X	X	X	X
Lucerne									X
Marcel	X	X	X	X	X	X	X	X	X
Margaret	X	X	X	X	X	X	X	X	X
McDonald					X	X	X		X
Meridian	X	X	X	X					X
Mirror	X	X	X	X	X	X	X	X	X
Morton								September	X
Neilson (Holm)	X	X	X	X	X	X	X	X	X
North	X	X	X	X	X	X	X	X	X
Paradise				April	X	X	X	X	X
Pine	X	X	X	X	X	X	X		X
Pipe					X	X	X	X	X
Ravensdale									X
Retreat									X
Sammamish	X	X	X	X	X	X	X	X	
Sawyer					X	X	X	X	X
Shadow					X	X	X	X	X
Shady	X	X	X	X	X	X	X	X	X
Spring	X	X	X	X	X	X	X	X	X
Star									X
Steel	X	X	X	X	X	X	X	X	X
Trout					X	X	X	X	X
Twelve	X	X	X	X	X	X	X	X	X
Walsh									X
Welcome	X	X	X	X					X
Wilderness	X	X	X	X	X	X	X	X	X

Table 3-2: Physical Characteristics of Monitored Lakes

Lake Name	Location	Watershed (Acres)	Lake Area (Acres)	Mean Depth (Feet)	Max Depth (Feet)	Public Park	Boat Launch	Fish Present
Alice	2.5 miles S of Fall City	184	32	8	30	n	**Y**	ST,B,O
Allen	NE border of Sammamish	230	11	---	---	n	n	---
Ames	1.5 miles W of Carnation	1133	80	18	28	n	n	---
Angle	SeaTac	478	102	25	52	**Y**	**Y**	ST,B,O
Beaver-1	Sammamish	324	12	22	55	n	n	---
Beaver-2	Sammamish	1037	62	21	54	**Y**	**Y**	ST,B,O
Bitter	Seattle	331	19	16	31	**Y**	ct	B,O
Boren	Newcastle	660	15	18	34	**Y**	**Y**	ST,O
Burien	Burien	230	44	13	29	**Y**	n	---
Cottage	1.5 miles E of Woodinville	4275	63	15	25	**Y**	ct	ST,B,O
Desire	4 miles NW of Maple Valley	865	72	13	21	**Y**	**Y**	ST,B,O
Easter	Federal Way	121	11	---	---	n	n	---
Fivemile	1 mile E of Federal Way	593	38	18	32	**Y**	ct	ST,B
Francis	2 miles N of Maple Valley	377	20	4	9	n	n	---
Geneva	0.2 miles E of federal Way	198	29	19	46	**Y**	**Y**	ST,B
Grass	0.5 mi N of Lake Morton	160	15	---	---	n	n	---
Haller	Seattle	260	15	---	36	n	ct	ST,B,O
Horseshoe	0.5 miles W of Black Diamond	256	10	---	---	n	n	---
Jones	Black Diamond	954	22	4	7	n	n	---
Joy	3 miles N of Carnation	468	105	23	50	n	n	---
Kathleen	2.2 miles E of Renton	304	39	7	22	n	n	---
Killarney	E border of Federal way	185	31	9	15	**Y**	**Y**	ST,B,O
Langlois	1.25 miles east of Carnation	226	39	53	98	n	**Y**	---
Leota	Woodinville	482	10	12	24	n	n	---
Lucerne	Maple Valley	409	16	18	37	n	n	---
Marcel	3 miles N of Carnation	1290	33	---	17	n	n	---
Margaret	4.25 miles NE of Duvall	1777	53	18	43	n	**Y**	ST,B
McDonald	2.8 miles E of Renton	82	18	23	47	n	n	---
Meridian	Kent	726	150	41	90	**Y**	**Y**	ST,B,O
Mirror	Federal Way	168	19	12	27	n	n	---
Morton	2 miles W of Black Diamond	250	66	15	23	n	**Y**	ST,B
Neilson (Holm)	2.5 miles E of Auburn	166	19	18	31	**Y**	**Y**	ST,B
North	E border of Federal Way	425	55	14	34	n	**Y**	ST,B,O
Paradise	2 miles E of Woodinville	2419	18	17	28	n	n	---
Pine	Sammamish	469	88	20	39	**Y**	**Y**	ST,B,O
Pipe	Maple Valley/Covington	313	52	27	65	n	n	---
Ravensdale	1.75 E of Ravensdale	660	18	4	14	n	n	ST
Retreat	0.25 W of Ravensdale	960	51	23	50	n	n	---
Sammamish	Issaquah/Sammamish/Bellevue	62517	4893	58	105	**Y**	**Y**	ST,B,O
Sawyer	Black Diamond	8120	279	26	58	**Y**	**Y**	B,O
Shadow	1 mile N of Covington	310	50	22	45	n	**Y**	ST,B,O
Shady	3.5 miles NW of Maple Valley	197	21	21	40	n	**Y**	ST,B
Spring (Otter)	3 miles NW of Maple Valley	443	68	19	32	**Y**	**Y**	ST,B,O
Star	0.1 mile E of Federal Way	376	34	25	50	n	**Y**	ST,B,O
Steel	Federal Way	254	46	13	24	**Y**	**Y**	ST,B
Trout	0.3 miles W of Pacific	1016	18	17	27	n	**Y**	ST,B
Twelve	0.5 miles NE of Black Diamond	449	41	13	28	n	**Y**	ST,B,O
Walsh	4.5 mi NE of Maple Valley	1905	73	---	---	n	n	---
Welcome	2.55 miles NE of Redmond	573	17	---	---	n	n	---
Wilderness	Maple Valley	328	67	21	38	**Y**	**Y**	ST,B,O

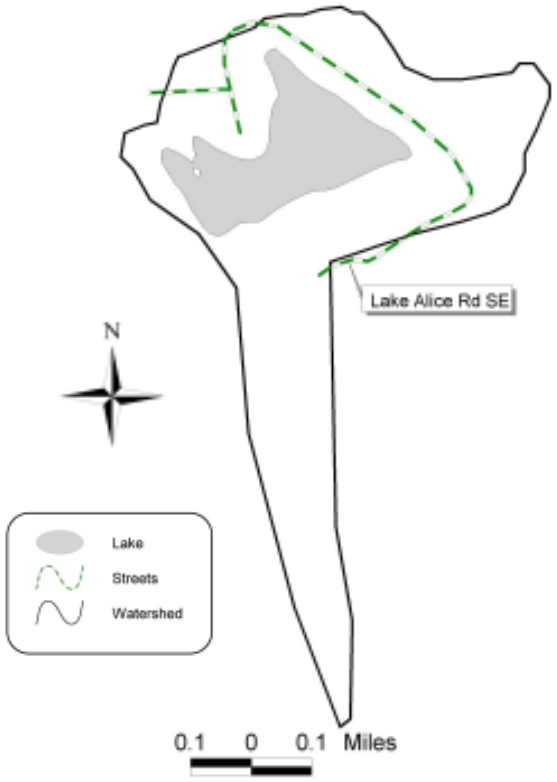
Key: n=No; **Y=Yes**; ct = Car top boats, no ramp; ST=Stocked Trout; B=Bass; O=Other Fish

Overview

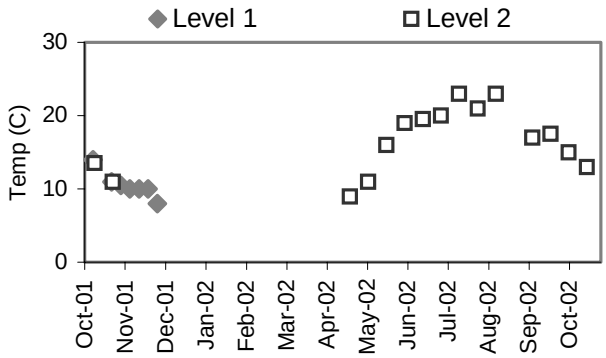
Volunteer monitoring began at Lake Alice in 2000 and continued through 2002. The three years of data suggest that this lake is relatively low in phytoplankton productivity (oligotrophic to mesotrophic) with very good water quality. The size of the lake relative to its watershed makes direct rainfall an important percentage of the water entering the lake. This may protect the lake to some extent from development activities in the watershed, but care should still be taken to ensure that development does not contribute to deterioration in water quality.

Lake Alice has a public access boat ramp, and residents should keep a watchful eye on aquatic plants growing nearshore around the lake to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious aquatic weeds.

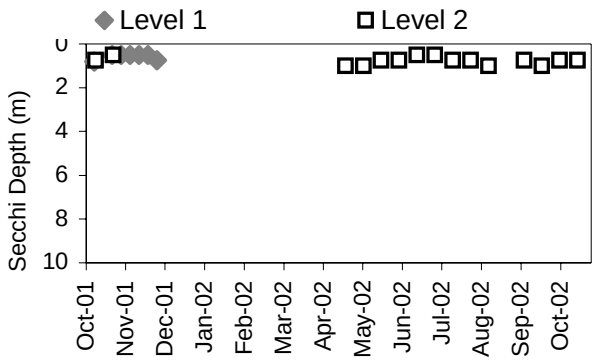
Watershed Map



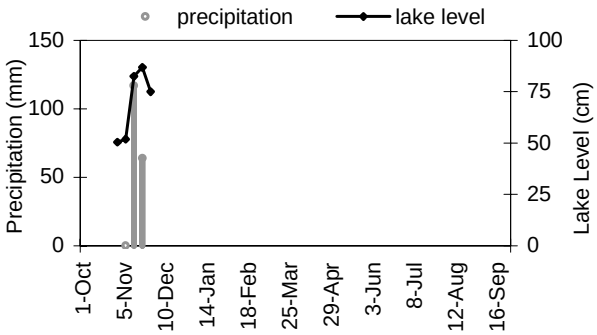
Lake Temperature



Secchi Depth



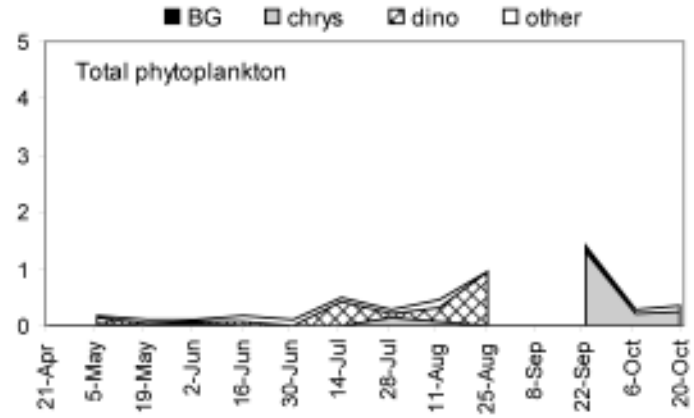
Lake Level and Precipitation



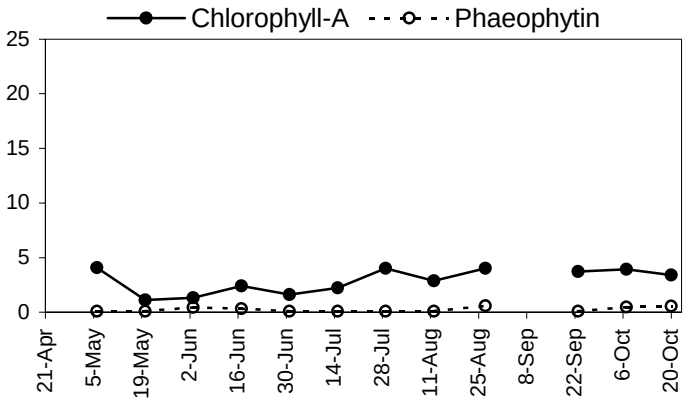
Secchi transparency was relatively stable from May through October, varying from 3 to 4.5m. Both the surface temperature and the lake level readings were incomplete for the year, but temperatures through the Level II sampling season were similar to other lakes monitored in 2002, with a maximum of 25.0 deg C.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations in the lake remained at relatively low volumes through the sampling season, with the peak occurring in late summer. The algal group best represented was the dinoflagellates, with the genus *Ceratium* predominating, similar to 2001. Other algae present in 2002 included several species of green algae and cryptomonads. Bluegreen algae were present only in small amounts. This is generally mirrored by the chlorophyll concentration data for the year, although one higher chlorophyll value early in the season was not reflected by the phytoplankton count. Degraded chlorophyll (phaeophytin) remained low through the sample period.



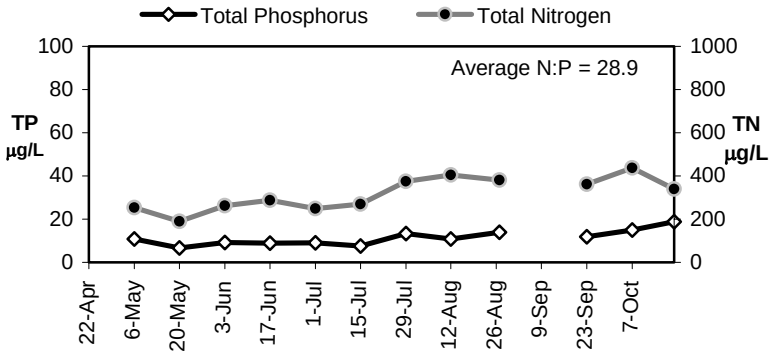
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

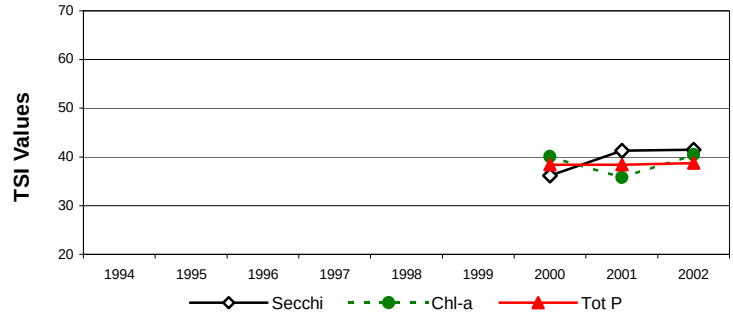


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in fairly constant proportion to each other, slowly rising through the sampling season. The ratio ranged from 18 to 37, mostly above the range considered advantageous to nuisance bluegreen algae.

Average TSI values in 2002 varied near the threshold of 40, which divides the oligotrophic and mesotrophic categories. All values were close to each other, but TSI-Secchi was slightly higher than TSI-chlor and TSI-TP.





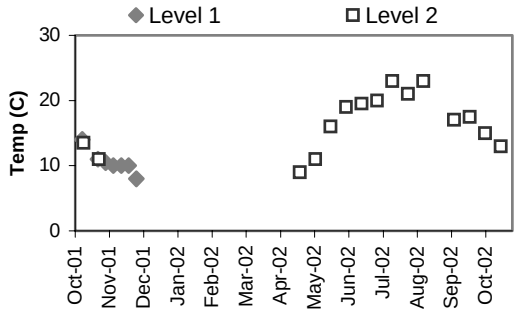
Overview

Volunteer monitoring began at Allen Lake in 1994 and continued through 2002. The lake has been consistently high in primary productivity (eutrophic) with fair water quality. Since the lake surface makes up only 2% of the entire catchment area, runoff and groundwater provide most of the water entering the lake. The lake may be naturally productive as part of a large Class 1 wetland system which feeds into the lake (King County 1990). Much of the shoreline is classified as Class 1 wetland as well.

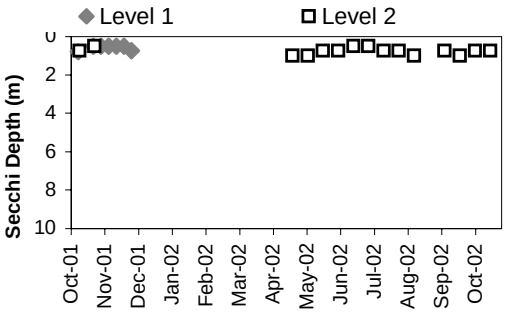
Allen Lake does not have a public access boat ramp. However, residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea, or other noxious aquatic weeds.

Watershed Map

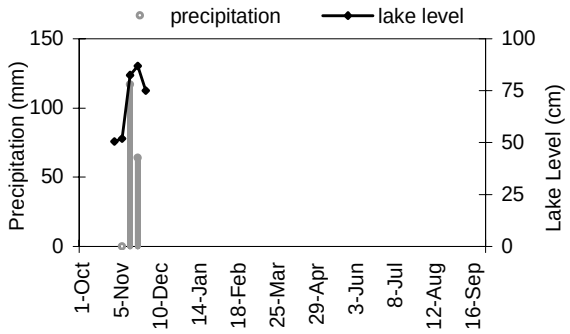
Lake Temperature



Secchi Depth



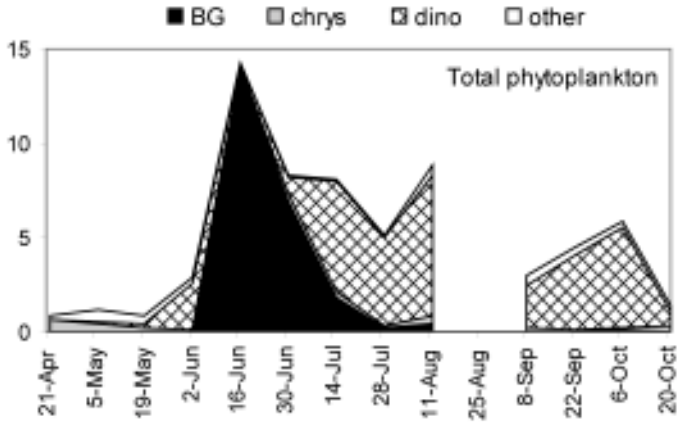
Lake Level and Precipitation



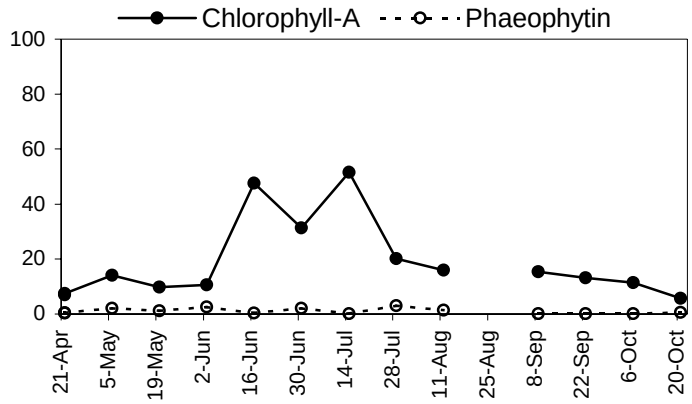
Secchi transparency was relatively stable through the year, staying near 1m due in part to the highly colored water. Both the surface temperature and the lake level readings were incomplete for the year, but temperatures through the Level II sampling season were similar to other small lakes monitored in 2002, with a maximum reading of 23 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations in the lake reached a maximum in early to mid summer, representing a bloom by the bluegreen *Anabaena*. This was followed by the dinoflagellate *Ceratium*, which remained high through mid-October. Chlorophyll values recorded the bluegreen maximum, but decreased as *Ceratium* became dominant, possibly reflecting a smaller amount of chlorophyll per cell volume contained by that variety.



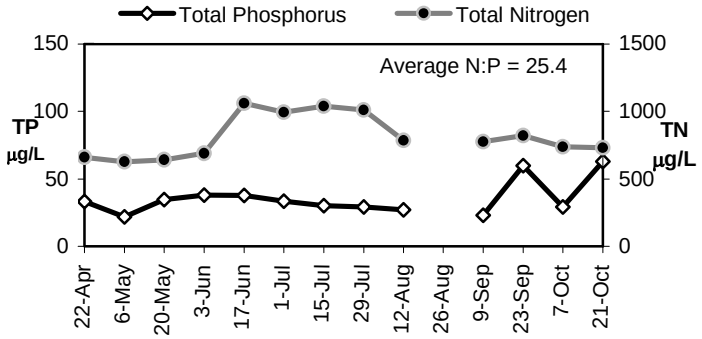
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

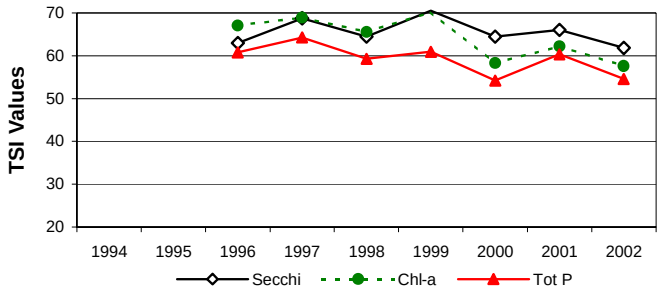


Nutrient Analysis and TSI Ratings

Total phosphorus remained fairly steady until fall, while total nitrogen increased slightly in summer relative to spring and fall values. The ratio ranged from 11 to 34, indicating some periods were favorable for bluegreen growth.

TSI values over the last seven years have suggested a slow downward trend, and the 2002 values continued the decline. For the past three years TSI-Secchi has been higher than the other indicators, suggesting that watercolor may be impacting the value.



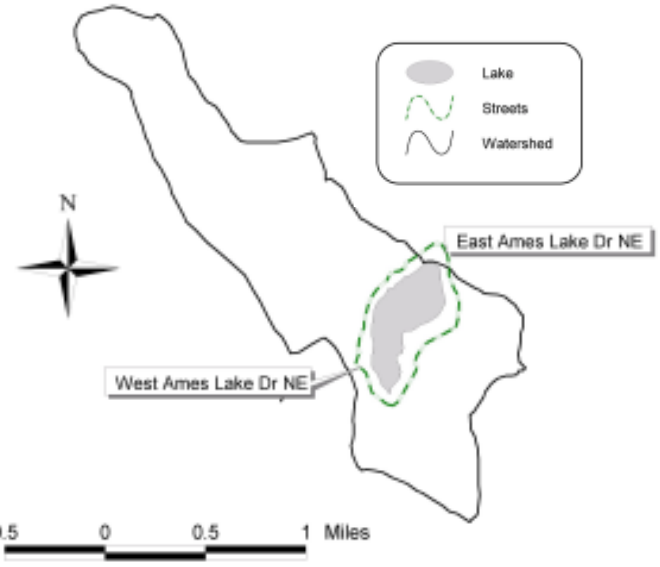


Overview

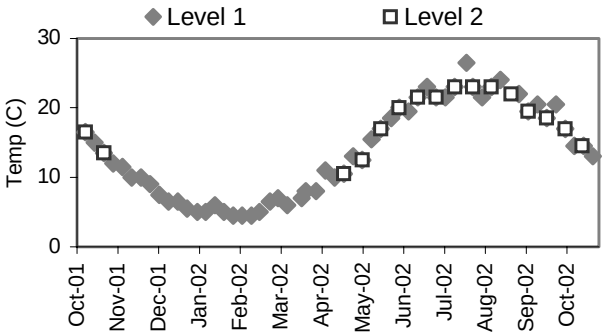
Volunteer monitoring began at Ames Lake in 2000 and continued through 2002. The three years of data collected indicate the lake is low to moderate in primary productivity (oligotrophic to mesotrophic) with very good water quality. The lake surface makes up about 7% of the drainage area, indicating that surface runoff and groundwater likely constitute the majority of water inputs, making land use very important to water quality. The King County Wetland Inventory listed two Class 1 wetlands that drain to the lake (King County, 1990).

Ames Lake does not have a public access boat ramp. However, residents should monitor aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious aquatic weeds.

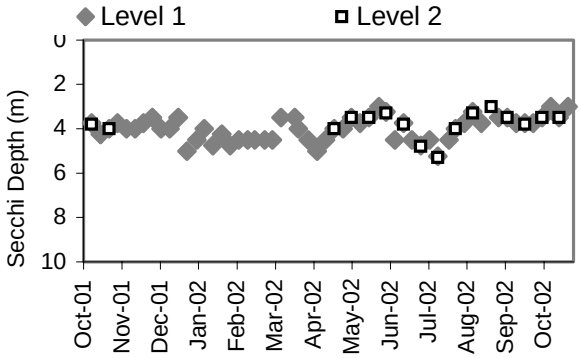
Watershed Map



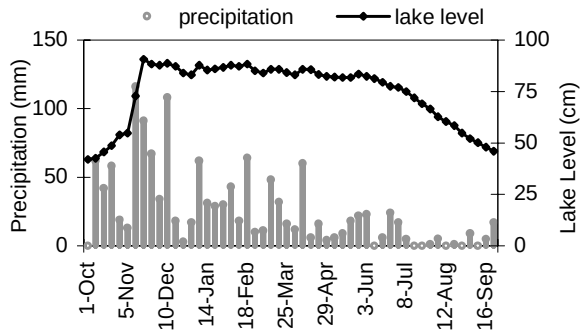
Lake Temperature



Secchi Depth



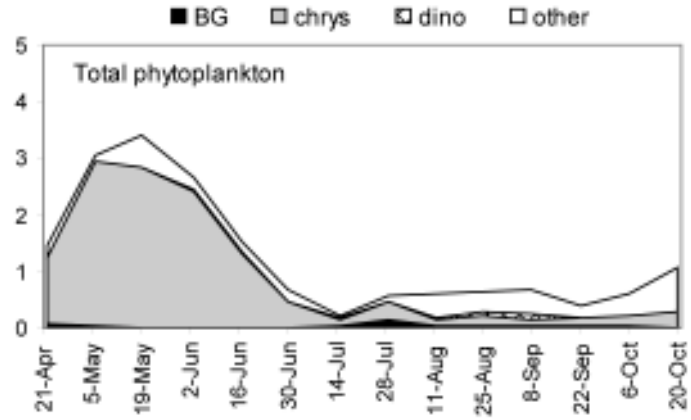
Lake Level and Precipitation



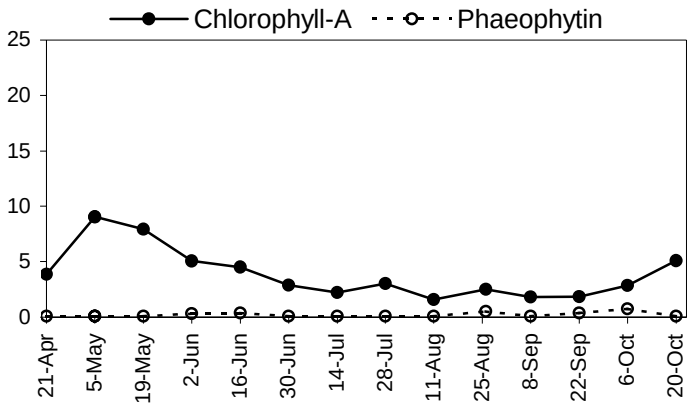
Secchi transparency ranged from 3.0 to 5.3m during the year. Surface water temperatures ranged from 4.5 to 26.5 degrees Celsius. Excellent precipitation and water level data recorded a sharp rise in fall, stability over the winter and a slow decline in summer to the low stand at the end of the water year.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Total phytoplankton biovolume remained were moderate in spring and dropped to low levels through the rest of the sampling season. Algae populations in the lake reached their maximum in spring, dominated by the diatom *Cyclotella bodanica* similar to the two previous years of data. The diatoms were replaced in summer and fall by a variety of algal species, without any particular species predominating. The chlorophyll concentration data showed a similar pattern, though not as pronounced. Phaeophytin (degraded chlorophyll) remained very low through the sampling season.



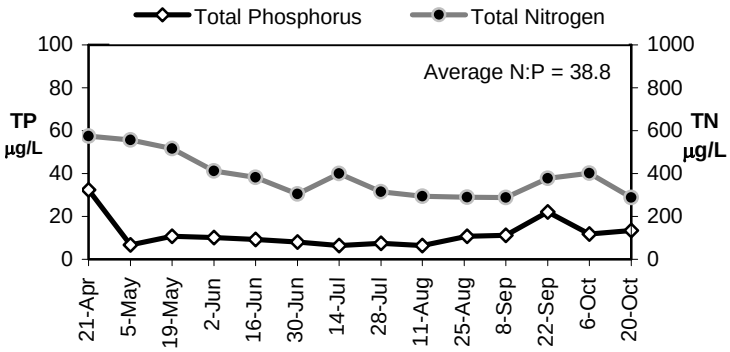
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

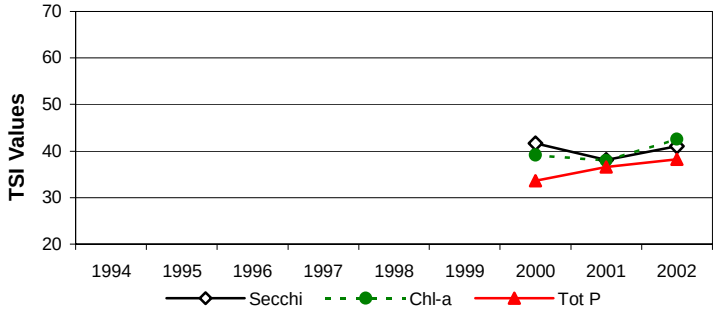


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in fairly constant proportion to each other with total nitrogen declining slowly over the season, while total phosphorus remained relatively steady. The N:P ratio ranged from 17 to 82, most of the time indicating poor conditions for bluegreens.

Average TSI values in 2002 were in good agreement with each other, close to the threshold of mesotrophic productivity. TSI-TP has been consistently lower than the other two indicators.



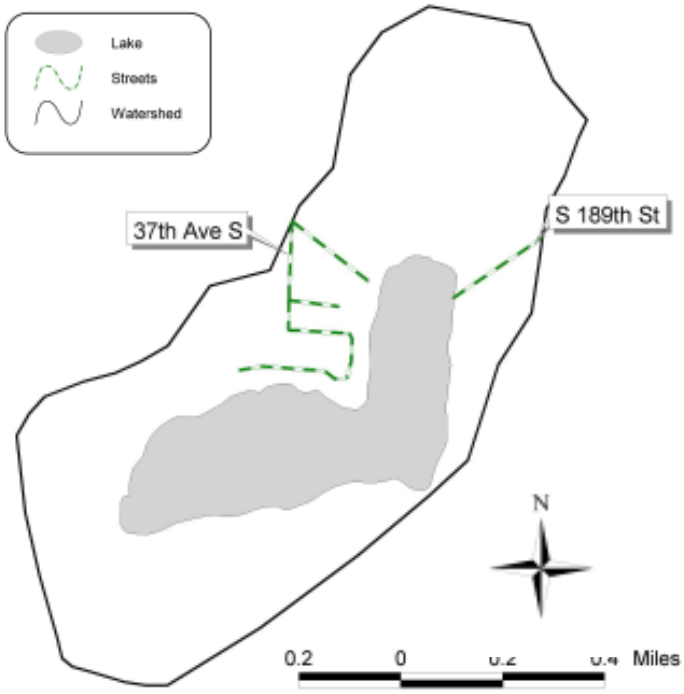


Overview

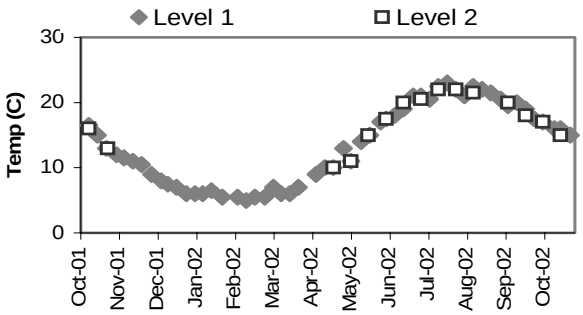
Volunteer monitoring began at Angle Lake in the 1980s and continued through 2002. Collected data show that this lake in the city of SeaTac is low in primary productivity (oligotrophic), with excellent water quality. However, productivity may be increasing slowly over time. Since the lake surface makes up 20% of the total drainage area, direct precipitation is an important input, although stormwater runoff and groundwater also contribute. There are no inventoried wetlands in the basin (King County 1990), and the urban nature of area land use is important to water quality.

Angle Lake has a public access boat ramp, and residents should monitor aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious aquatic weeds.

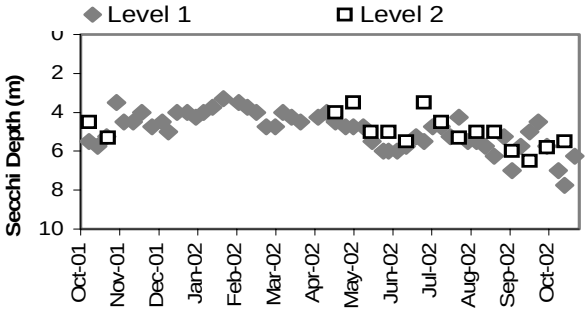
Watershed Map



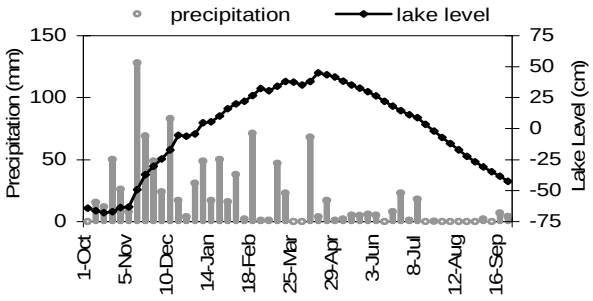
Lake Temperature



Secchi Depth



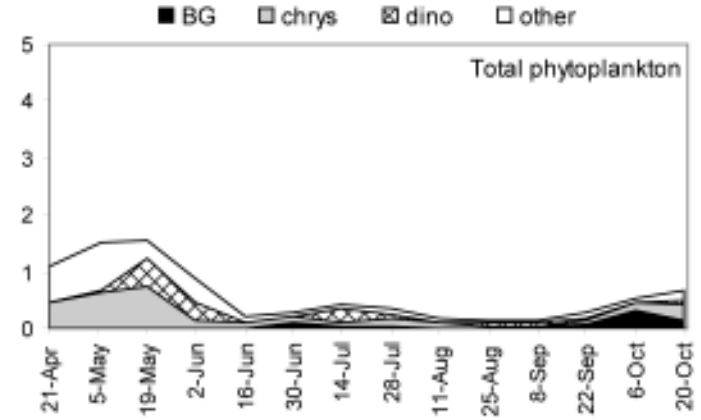
Lake Level and Precipitation



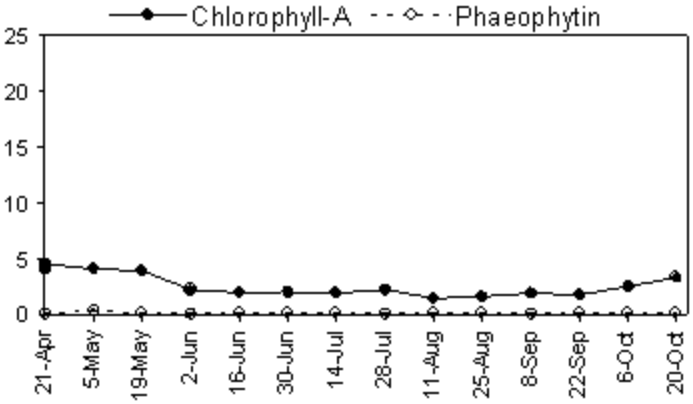
Secchi transparency ranged from 3.3 to 7.8m during the year. Surface water temperatures ranged from 5 to 23 degrees Celsius.Water levels climbed from a very low stand in fall to a high in April, dropping steadily through the following summer. Precipitation was concentrated in November through April typical of the region and consistent with water levels in the lake.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations remained low through the entire sampling season. A small peak occurred in spring, dominated by combination of the chrysophyte *Dinobryon*, dinoflagellate *Peridinium* and the chlorophyte *Botryococcus*. A mix of species coexisted through the rest of the sampling season, with the bluegreens *Aphanizomenon* and *Anabaena* appearing in small amounts in October. Chlorophyll content tracked the phytoplankton closely, remaining at low levels through the period. phaeophytin (degraded chlorophyll) remained at very low levels through the sampling period.



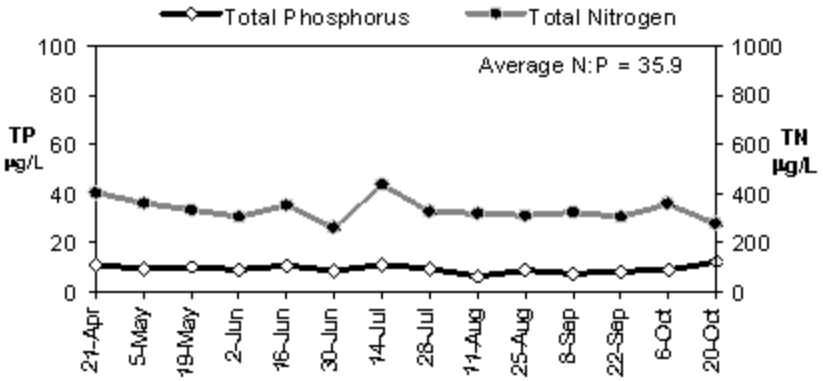
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

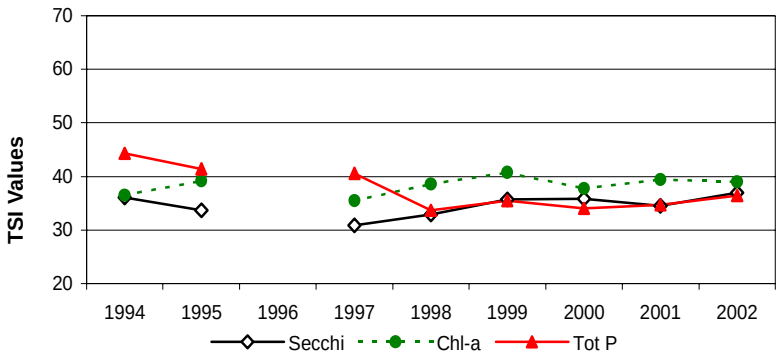


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained closely proportional to each other through the period of measurement, with their ratio ranging from 22 to 50, above the threshold for any advantage for bluegreens.

In 2002 average TSI-chlor was slightl higher than TSI-Secchi or TSI-TP, similar to the last four years. Howeve all three indicators fell within the higher end of the oligotrophic range.



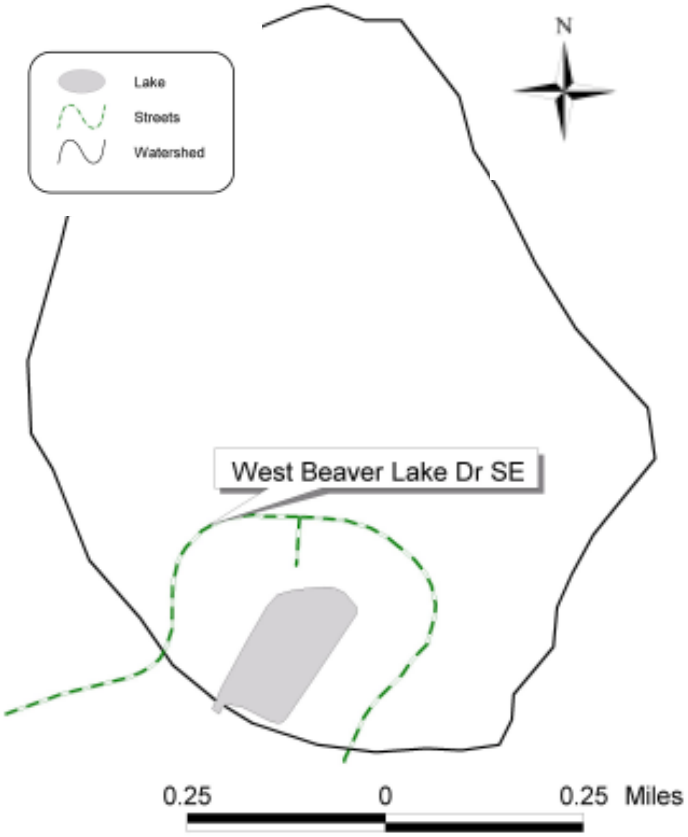


Overview

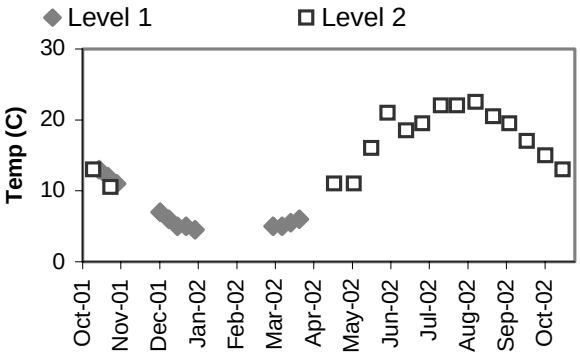
Volunteer monitoring began at Beaver Lake #1 (Little Beaver) in 1997 and continued through 2002. Monitoring data show that this lake in the city of Sammamish is relatively high in primary productivity (borderline between mesotrophic and eutrophic), with fair water quality, although productivity may be decreasing. Since the lake surface makes up only 5% of the drainage area, direct precipitation is less important than runoff, inlet streams or groundwater, making land use very important to water quality. There are significant wetlands in the basin, and the area is currently urbanizing. Enhancement of productivity through human impacts is likely to be occurring.

Beaver 1 has no public access boat ramp, but can be accessed through Beaver 2. Residents should monitor plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea, or other noxious aquatic weeds.

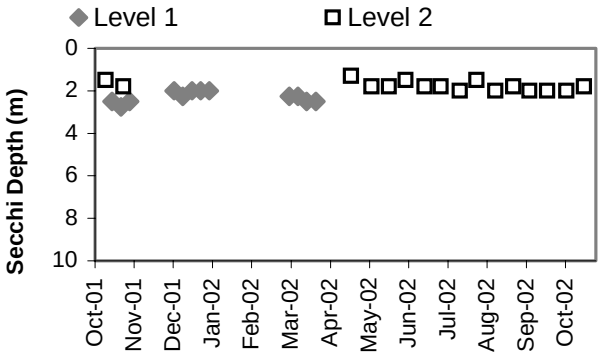
Watershed Map



Lake Temperature



Secchi Depth



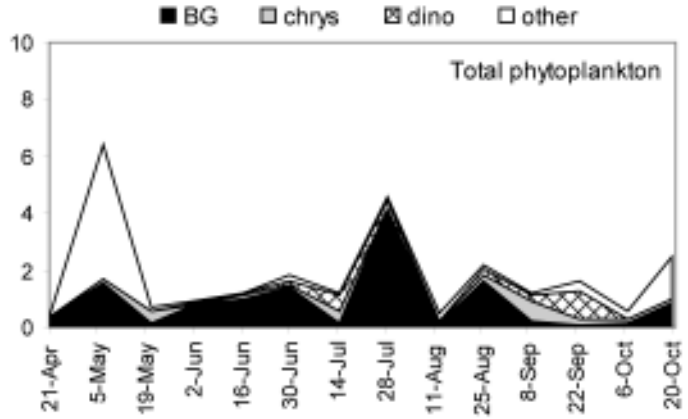
Lake Level and Precipitation

No Data Available

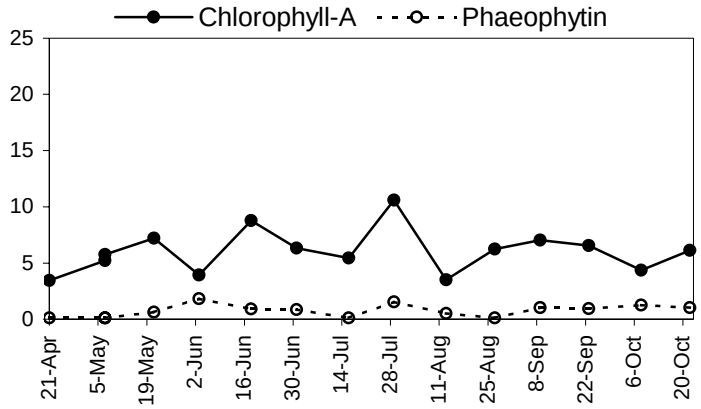
Secchi transparency remained steady, ranging from 1.8 to 2.3, likely related to the tea color of the water. Surface water temperatures were similar to other small lakes in 2002, with a high of 22.5 degrees Celsius. There were no data collected on lake levels or precipitation.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations made several peaks through the sampling season. With one exception the peaks were related to the abundance of the colonial bluegreen *Aphanizomenon*, which can concentrate at the water surface in calm weather. The peak in May was caused by the chlorophyte *Volvox*, a colonial species capable of moving vertically through the water column. Chlorophyll content also showed peaks, but tracked the phytoplankton only in a general way, possibly related to the patchy concentrations of the colonies of *Aphanizomenon.* Phaeophytin (degraded chlorophyll) remained low through the season.



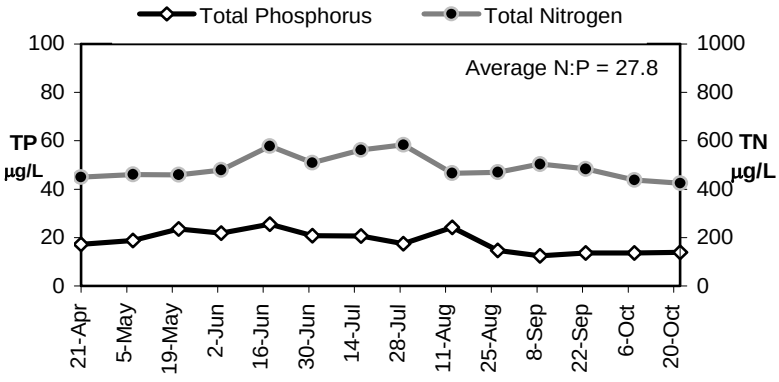
BG = Bluegreen; **chrys** = Chrysophytes;
dino = Dinoflagellates

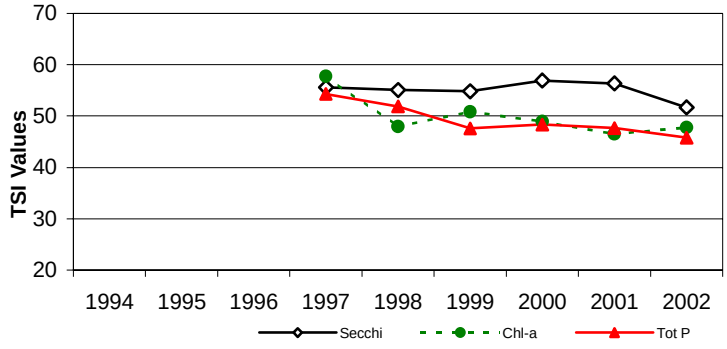


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained generally proportional to each other through the period. The N:P ratio ranged from 19 to 40.

In 2002 the average TSI-Secchi was higher than the other two indicators, similar to the previous four years, likely relating to the tea color of the water rather than to the algae in the lake. If the TSI-Secchi is disregarded, the other two indicators placed Beaver 1 below the threshold between mesotrophy and eutrophy.



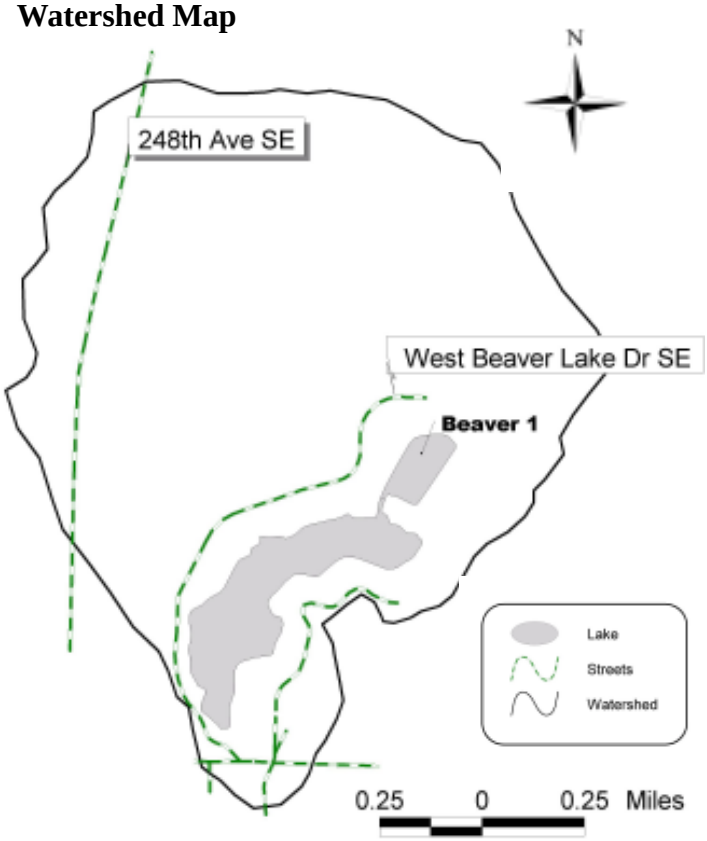


Overview

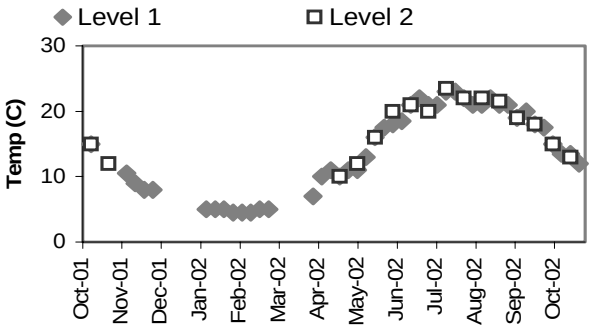
Volunteer monitoring began at Beaver Lake #2 (Big Beaver) in the 1980s and continued through 2002. The data collected show that this lake in the city of Sammamish is currently moderate in primary productivity (mesotrophic), with good water quality. Since the surface area of the lake makes up only 9% of the drainage area, direct precipitation is less important than surface and ground water inputs, suggesting that land use is very important to water quality. There are significant wetlands in the basin, and the area is currently urbanizing.

Beaver 2 has a public access boat ramp, and residents should monitor plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious aquatic weeds.

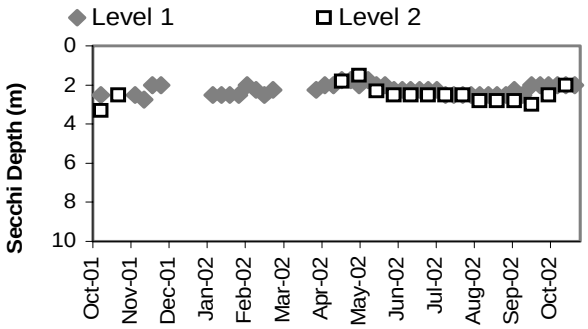
Watershed Map



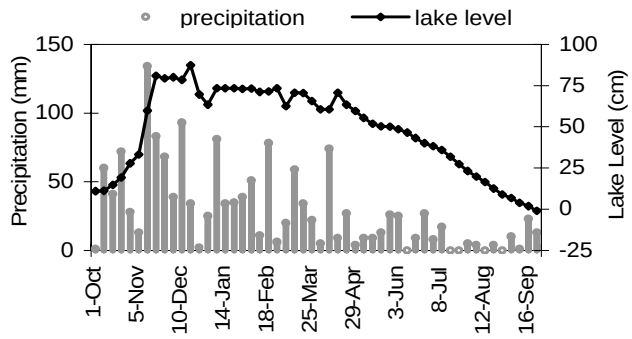
Lake Temperature



Secchi Depth



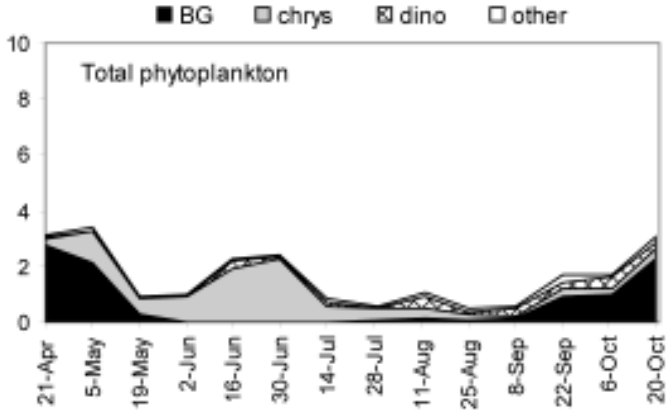
Lake Level and Precipitation



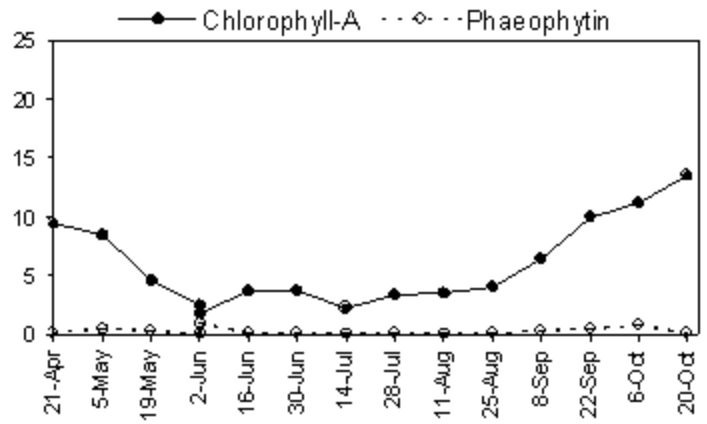
Secchi transparency remained steady, ranging from 1.5 to 3.3m in depth, significantly deeper than Beaver 1. Surface water temperatures ranged from 4.5 to 23.5 degrees Celsius. Water levels followed the pattern typical of regional lakes of a winter high stand, decreasing through the summer.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations made two peaks in spring and summer. The spring peak was caused by the bluegreen *Aphanizomenon*, while the diatoms *Cyclotella* and *Tabellaria* dominated the early summer peak. Other important algae found in the lake included the chrysophyte *Dinobryon* and the dinoflagellate *Ceratium*. Chlorophyll content decreased from a high early in the sampling period to lower values over summer, and then increased again in the fall, likely related to the volume of *Aphanizomenon* in the lake. Phaeophytin (degraded chlorophyll) remained very low through the sampling season.



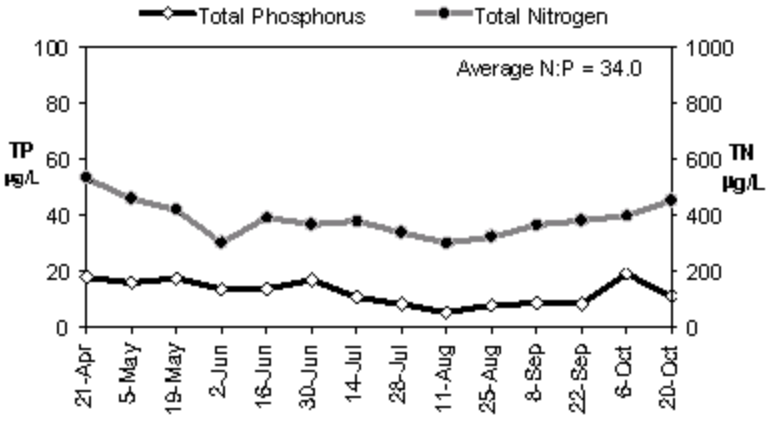
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

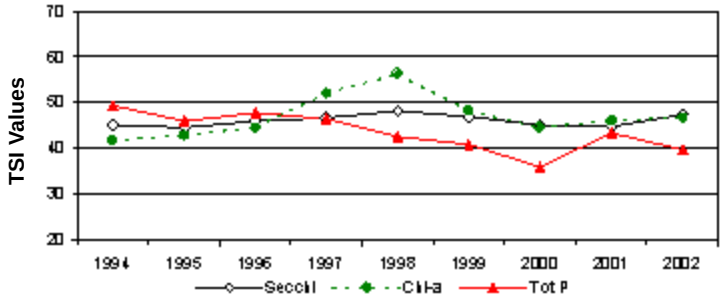


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in fairly constant proportions over the period of measurement. The N:P ratio ranged from 21 to 56.

In 2002 the average TSI-TP was lower than the other two indicators, similar to values in 1998-2000. The values for TSI-chlor and TSI-Secchi have tracked each other closely since 1999. Beaver 2 continued to place in the mid-mesotrophic range for productivity.



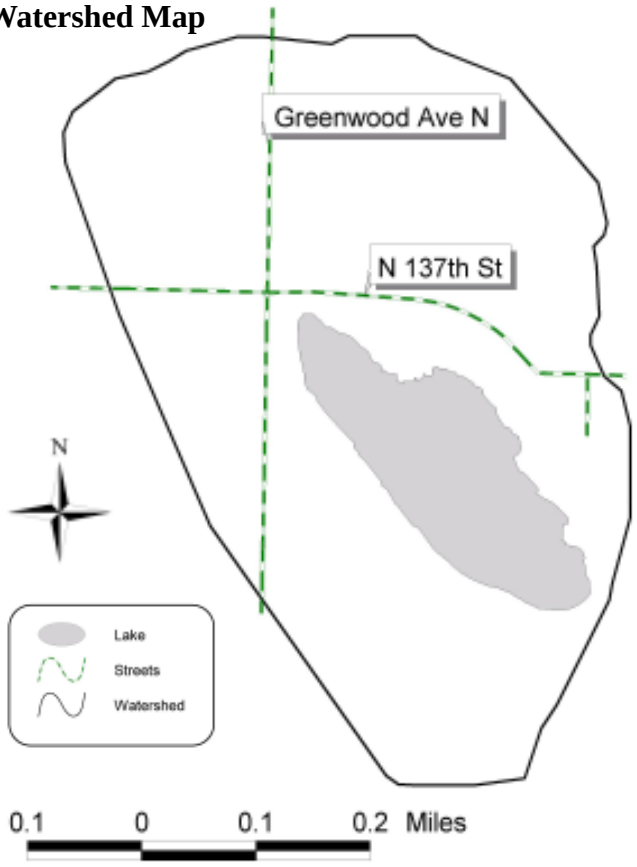


Overview

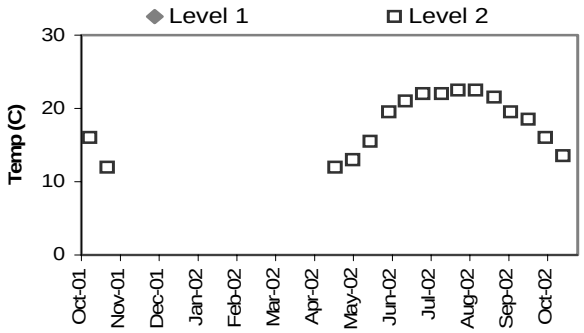
Volunteer monitoring began at Bitter Lake in the 1980s and continued, with a few exceptions, through 2002. The collected data classify this lake in the city of Seattle as moderate in primary productivity (mesotrophic), with good water quality, and remaining stable over time. The lake surface makes up 7% of the drainage area, suggesting that direct precipitation is less important than stormwater runoff and groundwater inputs, and land use is very important to water quality. There are no significant wetlands in the basin, and the area is urban. Enhancement of productivity through human impacts is likely to be occurring.

Bitter Lake has no public access boat ramp, but car top boats can be launched through the park. Residents should monitor aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea, or other noxious aquatic weeds.

Watershed Map



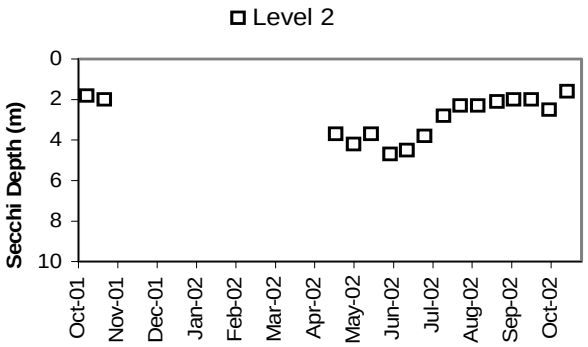
Lake Temperature



Lake Level and Precipitation

No Data Available

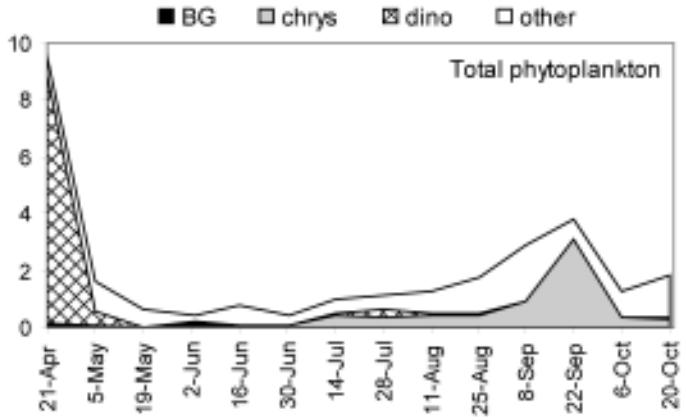
Secchi Depth



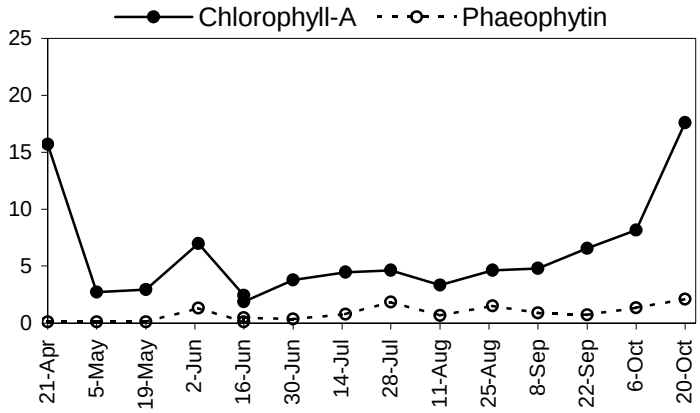
Secchi transparency ranged between 1.6 and 4.7m between April and October, similar to 2001. Surface water temperatures were similar to other small lakes, reaching a maximum of 22.5 degrees Celsius. No water levels or precipitation were recorded for the year.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

A phytoplankton maximum found in the first sample was followed by relatively low values through the sampling season, climbing again in late October. The spring peak was made by the dinoflagellate *Peridineum*, while fall was dominated by the diatoms *Asterionella* and *Tabellaria*. Chlorophyll content tracked the algae concentrations, showing major increases in April and late October, though it did not make a peak in late September. Phaeophytin (degraded chlorophyll) was low, though it was higher in value the latter half of the sampling season.



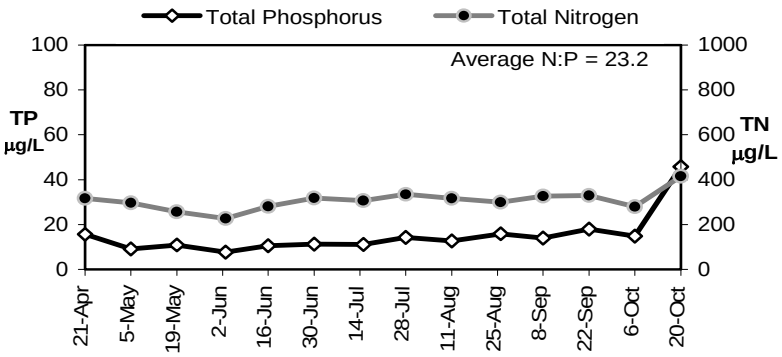
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

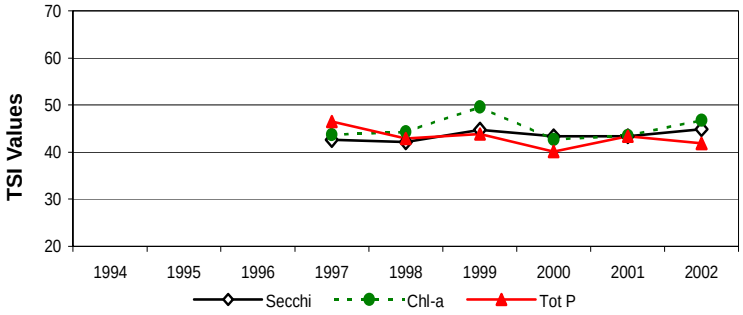


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in fairly constant proportion to each other until late October when phosphorus increased more rapidly than nitrogen. Their ratio ranged from 9 to 33.

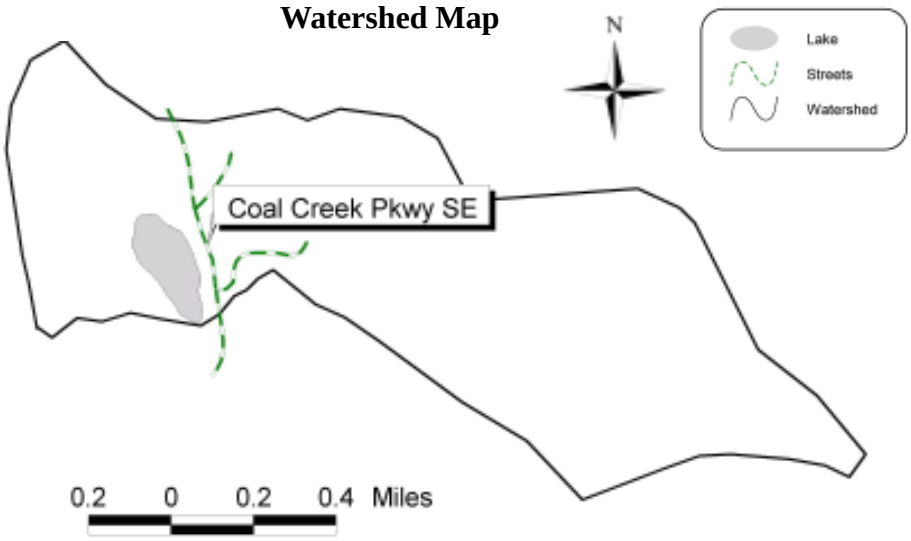
Average TSI values for the three indicators were close to each other in 2002 and were well within the mesotrophic range, similar to previous years.





Overview

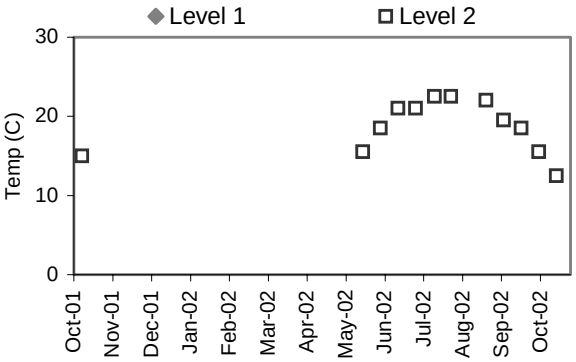
Watershed Map



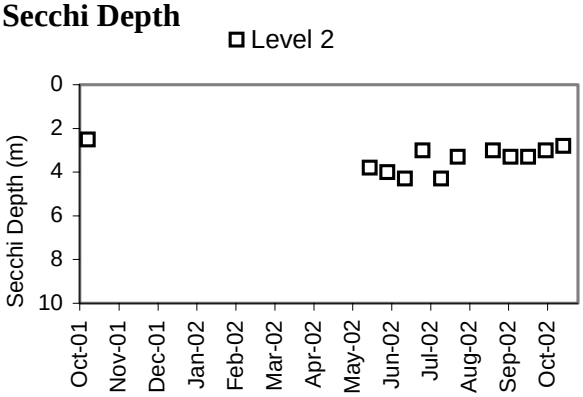
Volunteer monitoring began at Lake Boren in the 1980s and continued, with a several breaks, through 2002. Collected data classify this lake in the city of Newcastle as moderate in primary productivity (mesotrophic) with good water quality. Since the lake surface makes up just 2% of the drainage area, direct precipitation is less important than the inlet stream, stormwater runoff and groundwater inputs. This means that land use is very important to water quality. There are significant wetlands in the basin, and the basin consists of both urbanizing and undeveloped tracts. Enhancement of productivity through human impacts is likely to be occurring, but may be modified by careful drainage plans.

Lake Boren has a public access boat launch, and Eurasian milfoil has been found recently in the nearshore environment. Residents should watch the lake for the spread of this species or early infestations of Brazilian elodea and other noxious aquatic weeds.

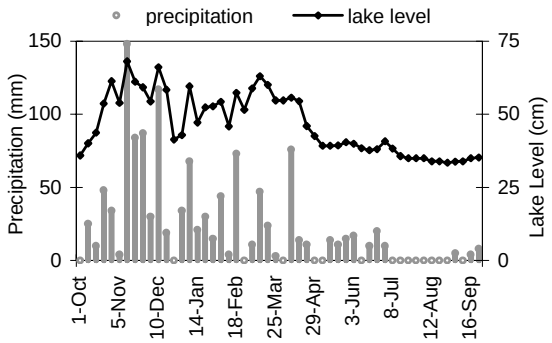
Lake Temperature



Secchi Depth



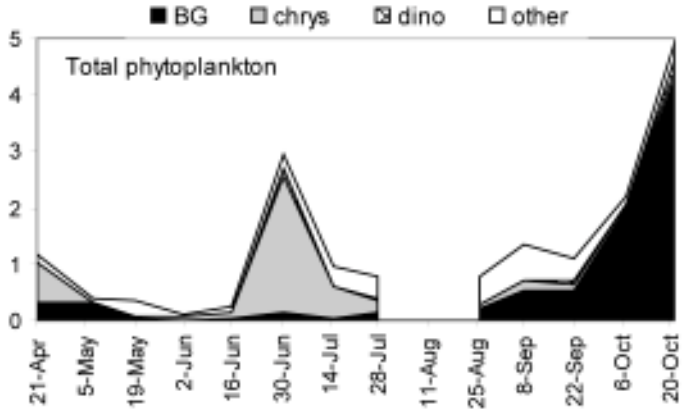
Lake Level and Precipitation



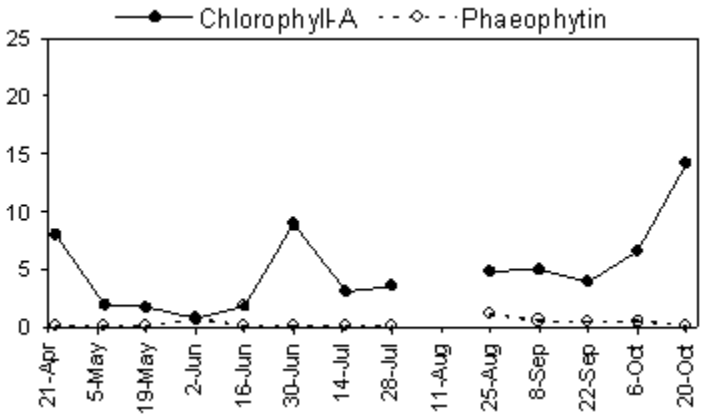
Secchi transparency ranged between 2.5 and 4.3m during the Level II sampling season. Excellent precipitation and water level records were available, showing that the lake level is fairly stable through the year, though showing a small decline in the summer months. Level II surface water temperatures were similar to other small lakes in 2002, reaching a maximum of 22.5 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations reached a maximum late June, followed by low values until October. The June bloom was made by the chrysophyte *Dinobryon*. The increase in October was due to the bluegreen *Aphanizomenon* and the chlorophyte *Botryococcus*. Chlorophyll content generally tracked the algal concentrations through the sampling season.



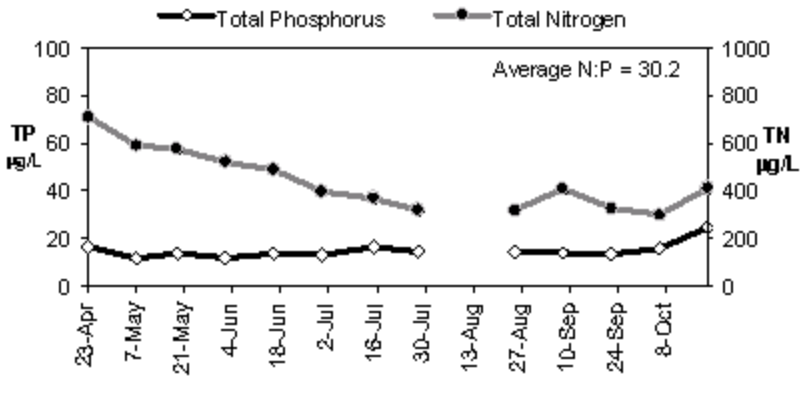
BG = Bluegreen; **chrys** = Chrysophytes;
dino = Dinoflagellates

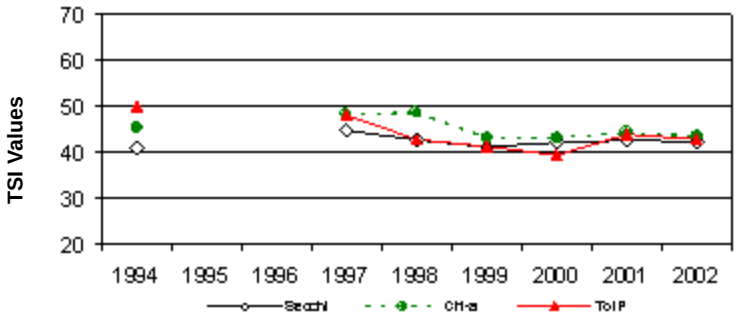


Nutrient Analysis and TSI Ratings

Total nitrogen decreased while total phosphorus remained constant for the early part of the season, but remained generally constant after mid-July. Their ratio ranged from 17 to 51.

TSI values for 2002 were similar to the previous three years, with the indicators very close to each other in the mesotrophic range.



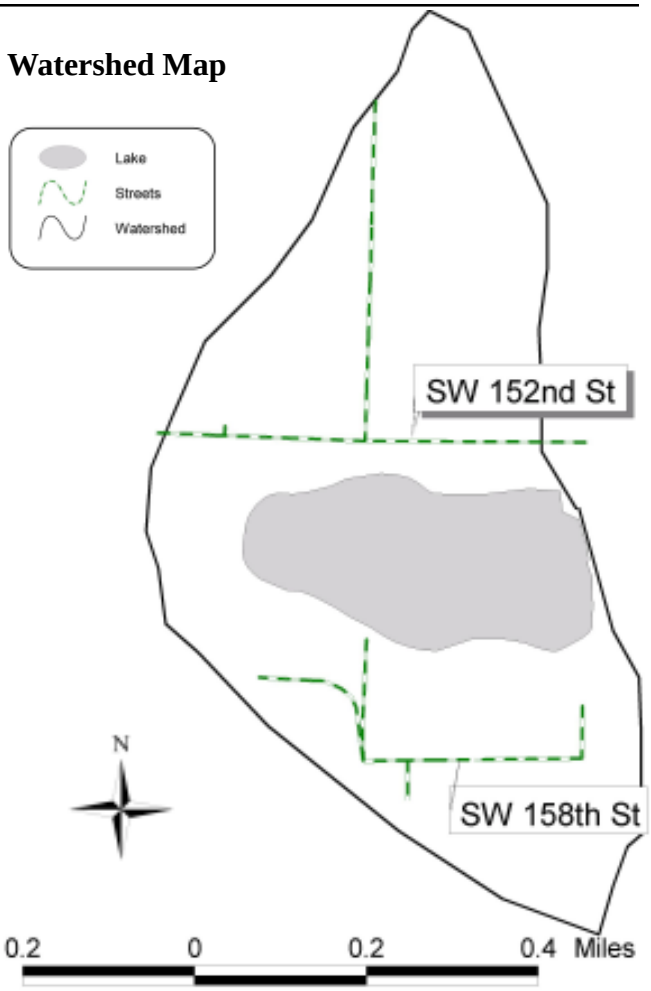


Overview

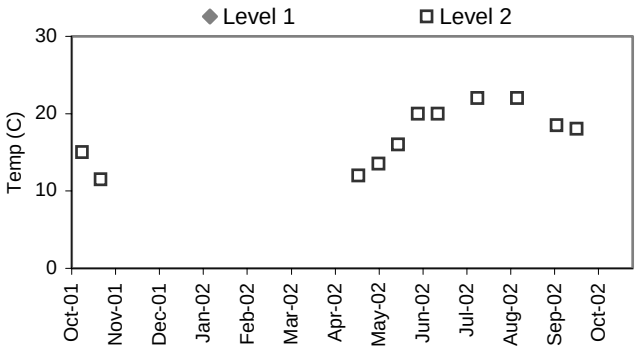
Volunteer monitoring began at Lake Burien in 1994 and continued in 1998, then from 2000 through 2002. The data collected classify this lake in the city of Burien at low to moderate in primary productivity (oligotrophic to mesotrophic) with very good water quality. Since the lake surface makes up 18% of the relatively large drainage area, direct precipitation is important, as well as ssurface and ground water inputs. There are no inventoried wetlands in the basin (King County 1990), although part of the shoreline is considerd wetland. Land use in the basin is mostly urban residential, with a small amount of commercial usage.

Lake Burien has no public access boat ramp, but residents should keep watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious aquatic weeds.

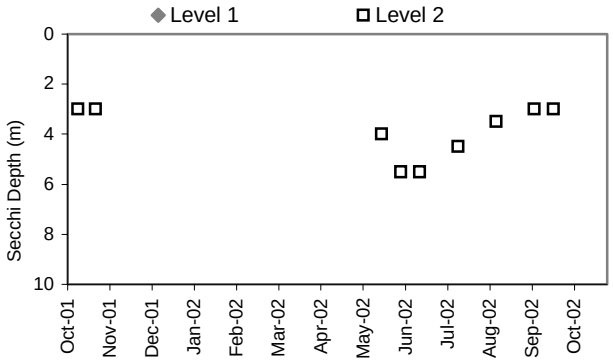
Watershed Map



Lake Temperature



Secchi Depth



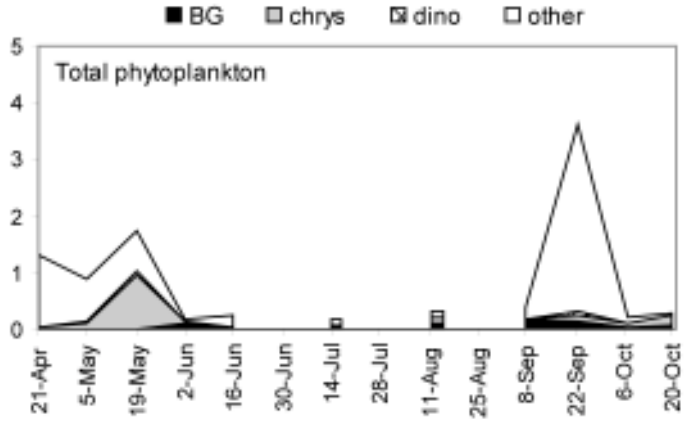
Lake Level and Precipitation

No Data Available

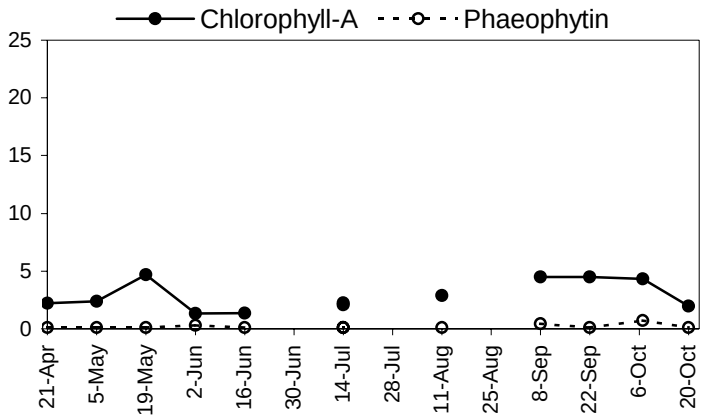
Secchi transparency ranged between 3.0 and 5.5m from April through October. Surface water temperatures reached a maximum of 22 degrees Celsius. No precipitation or water level records were available for the year.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations remained low during the sampling season, with a small peak late May and a larger one in late September. The spring peak was made by the chrysophyte *Dinobryon*, accompanied by several species of chlorophytes. The fall peak was made by the chlorophyte *Botryococcus*, accompanied by the bluegreen *Anabaena*. Chlorophyll content remained low, but tracked the small peak in May. The large single date value for *Botryococcus* was not reflected in the chlorophyll data. Phaeophytin (degraded chlorophyll) remained very low throughout the sampling season.



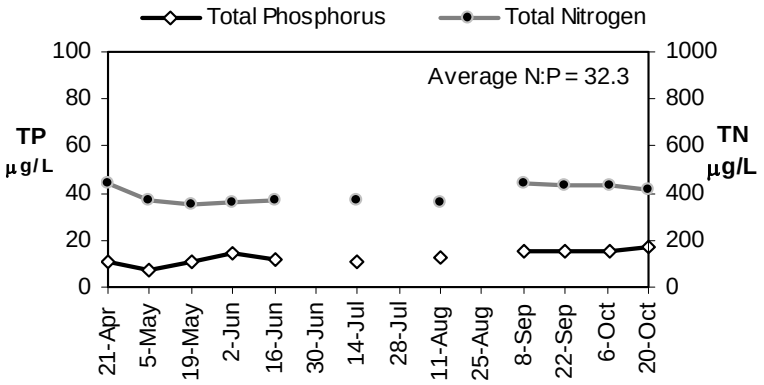
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

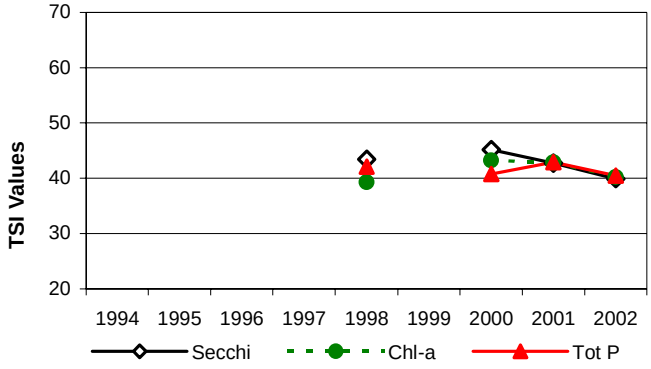


Nutrient Analysis and TSI Ratings

Both total phosphorus and total nitrogen remained fairly constant through the season. Their ratio ranged from 24 to 55.

In 2002 average TSI values for the three indicators were almost identical and remained in the lower part of the mesotrophic range, similar to previous years.



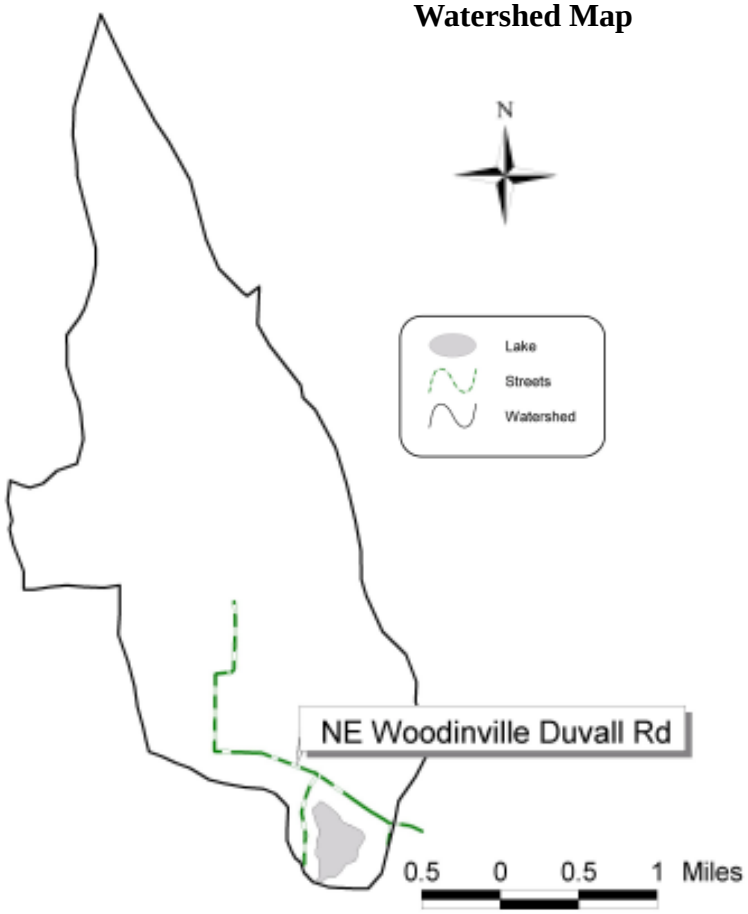


Overview

Volunteer monitoring began at Cottage Lake in 1995 and continued through 2002. The data collected classify this lake as relatively high in primary productivity (mesotrophic to eutrophic) with fair to good water quality. A possible decline in productivity has occurred in recent years. Since the lake surface makes up less than 2% of the large drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and groundwater inputs. There are several large wetlands in the basin (King County 1990), and land use is largely rural, although parts are currently urbanizing. Enhancement of productivity through human impacts was verified in the lake management plan (King County, 1996).

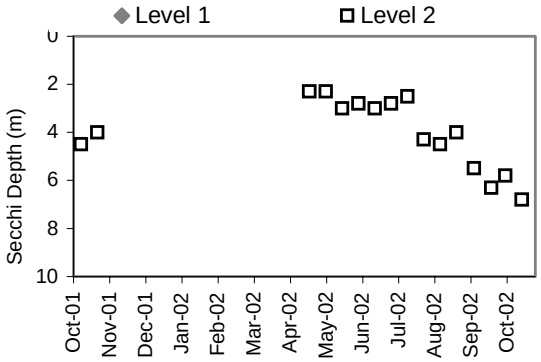
Cottage Lake has no public access boat ramp, but car top boats may be launched through the county park. Residents should monitor aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea, or other noxious aquatic weeds.

Watershed Map

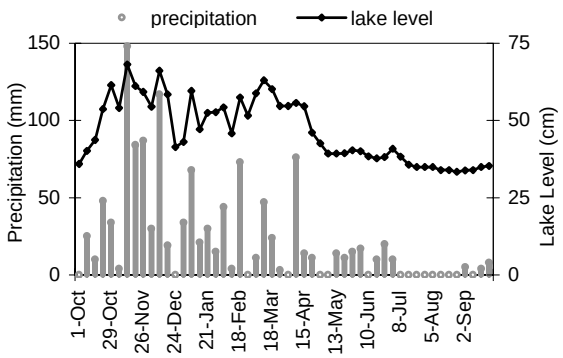


Lake Temperature

Secchi Depth



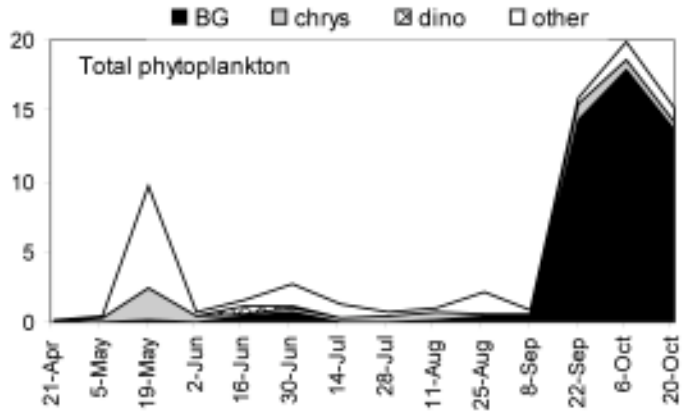
Lake Level and Precipitation



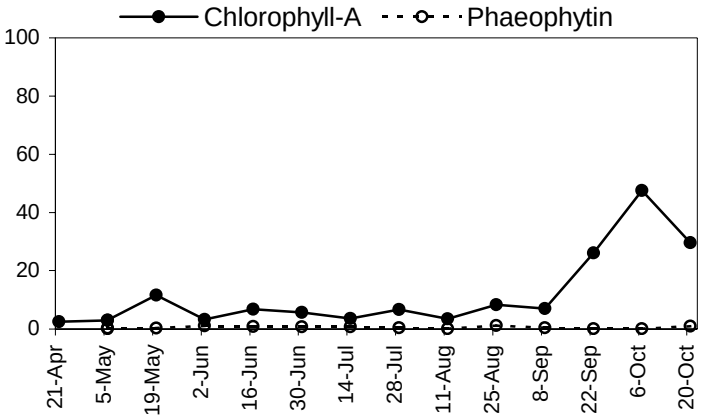
Secchi transparency ranged between 1.0 and 3.0m during the year. Surface water temperatures ranged from 3 to 24 degrees Celsius. Excellent precipitation and water level records were available for the year, showing that the lake level varied little through most of the year, rather relating to precipitation events.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations reached a smaller peak in late May and a much larger one in October. The May maximum was made by the chlorophyte *Volvox*, which can sometimes be overestimated in phytoplankton counts, accompanied by the chrysophyte *Dinobryon*. The maximum in October was due to the bluegreen *Aphanizomenon*. Other important algae found in the lake included the dinoflagellate *Ceratium* and a variety of chlorophyte species. Chlorophyll content recorded the small peak in late May and increased markedly in fall, tracking the *Aphanizomenon* population, similar to the pattern in 2001.



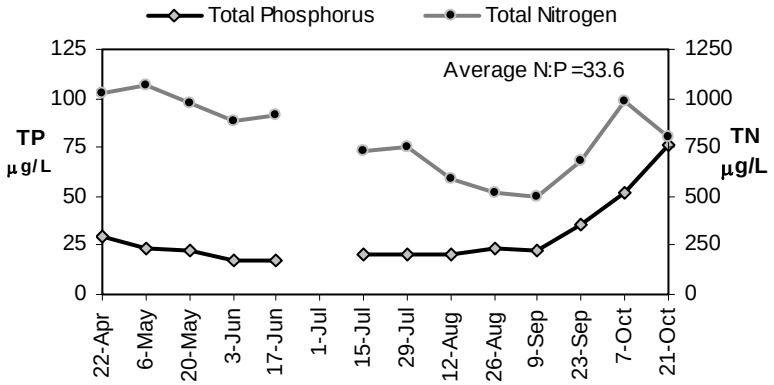
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

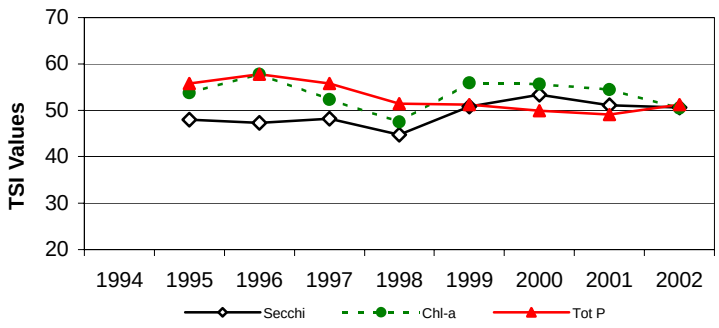


Nutrient Analysis and TSI Ratings

Total nitrogen declined through the sampling season until September, when both it and total phosphorus begin to increase. Their ratio ranged from 10 to 52, with better conditions for bluegreens indicated in the autumn months.

In 2002 average TSI values for the three indicators were nearly identical, on the threshold between mesotrophic and eutrophic conditions. They were most similar to 1998, although the indicators were further apart in that year.



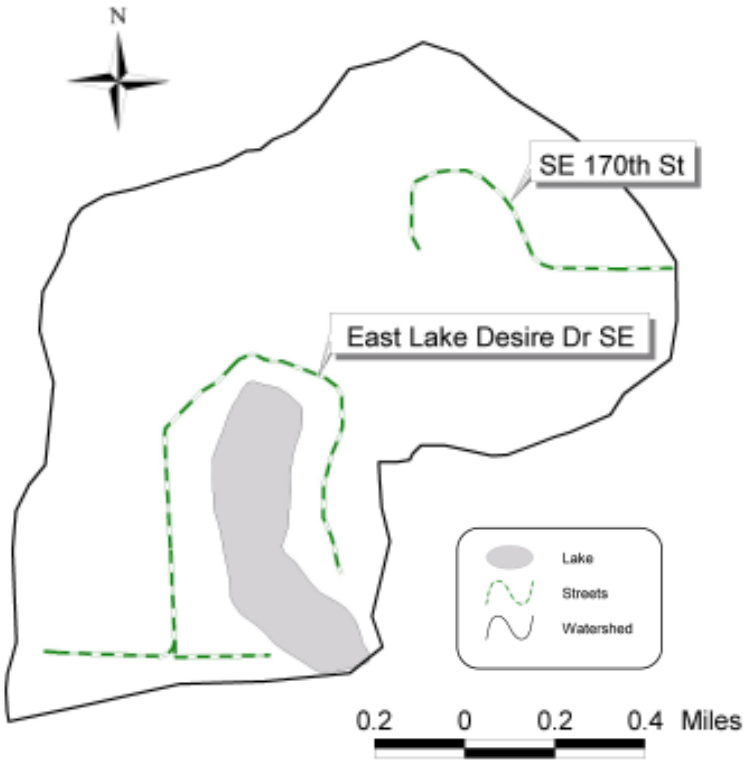


Overview

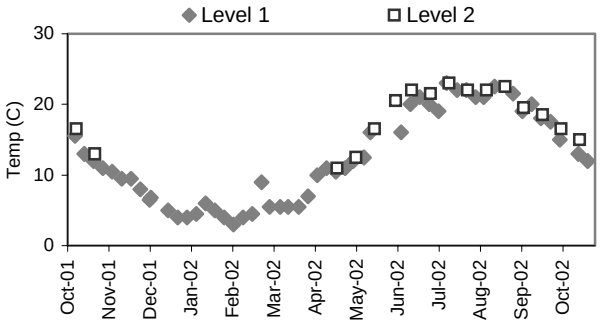
Volunteer monitoring began at Lake Desire before 1985 and continued through 2002. The data collected previously classified this lake as high in primary productivity (eutrophic) with fair water quality, although productivity has decreased in recent years and is now close to the mesotrophic threshold. Since the lake surface is approximately 8% of the drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and groundwater inputs. Therefore land use is very important to water quality. There are large wetlands in the basin, and the area is currently urbanizing. Enhancement of productivity through human impacts was verified in the Lake Management Plan (King County, 1995).

Lake Desire has a public access boat ramp, and Eurasian milfoil has been reported in the lake since 1995 although it has not yet spread aggressively. Residents should watch for an increase in this species, as well as early infestations of Brazilian elodea or other noxious aquatic weeds.

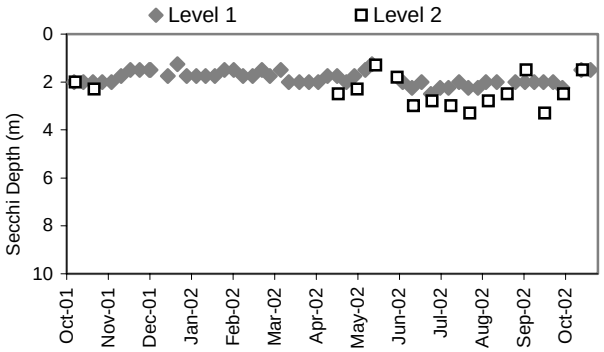
Watershed Map



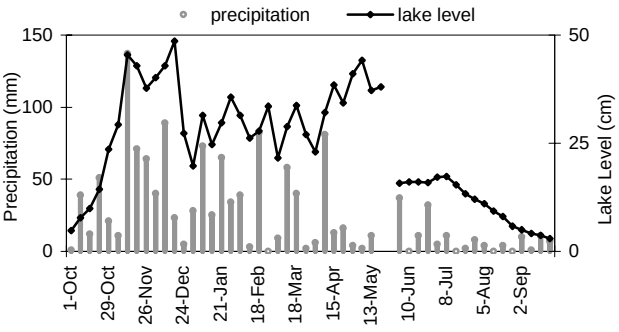
Lake Temperature



Secchi Depth



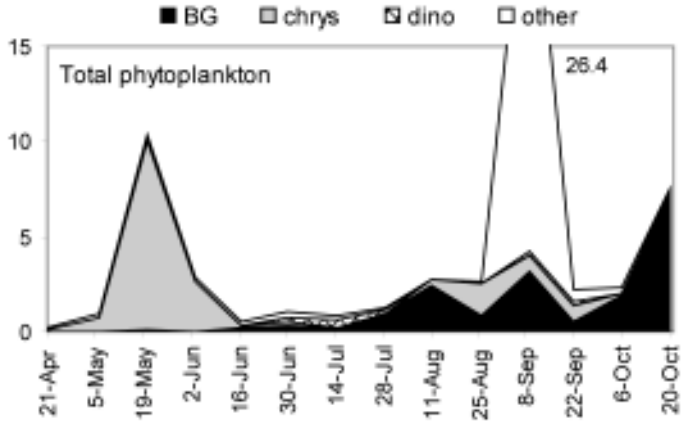
Lake Level and Precipitation



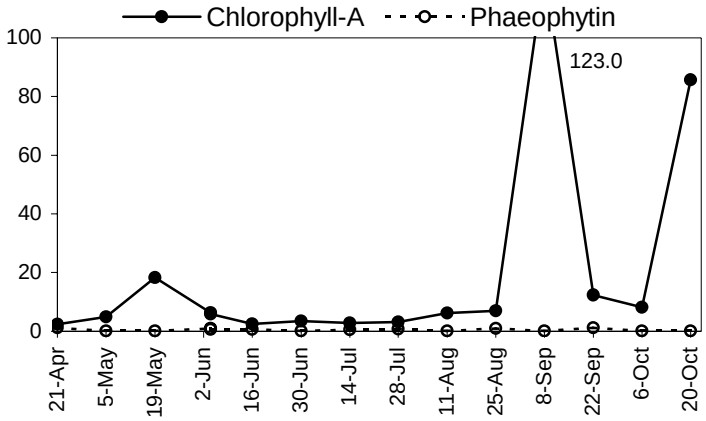
Secchi transparency ranged between 1.3 and 3.3m during the year. Good precipitation and water level records were available for 2002, showing that the lake level followed the typical northwest pattern of winter high – summer low, with an abrupt drop during a short period without data records. Surface water temperatures were similar to other small lakes in 2002, ranging from 3 to 23 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton made a large peak in mid-May, characterized by the diatom *Asterionella*. The fall maximum was dominated by a currently unidentified colonial species. Other important algae found in the lake included the bluegreens *Aphanizomenon* and *Anabaena*. Chlorophyll content tracked the rise of the phytoplankton populations fairly closely, corroborating the peaks in phytoplankton populations.



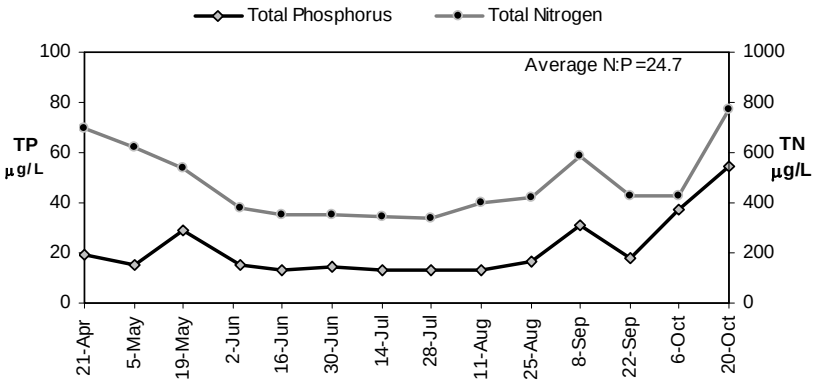
BG = Bluegreen; **chrys** = Chrysophytes;
dino = Dinoflagellates

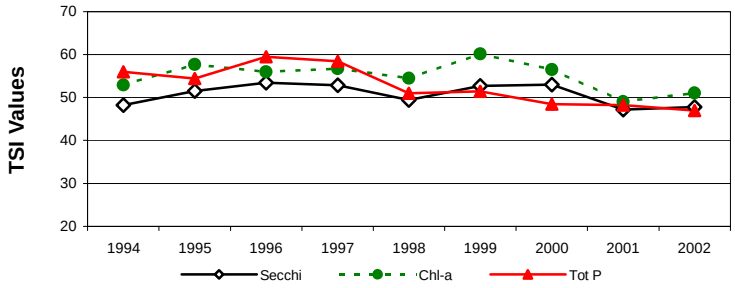


Nutrient Analysis and TSI Ratings

Total nitrogen declined early in the sampling season and then remained in fairly constant proportion to total phosphorus until late in the season when both rose in value. Their ratio ranged from 12 to 40.

In 2002 TSI values for the three indicators were fairly close to each other, placing near the threshold between mesotrophy and eutrophy, similar to 2001.



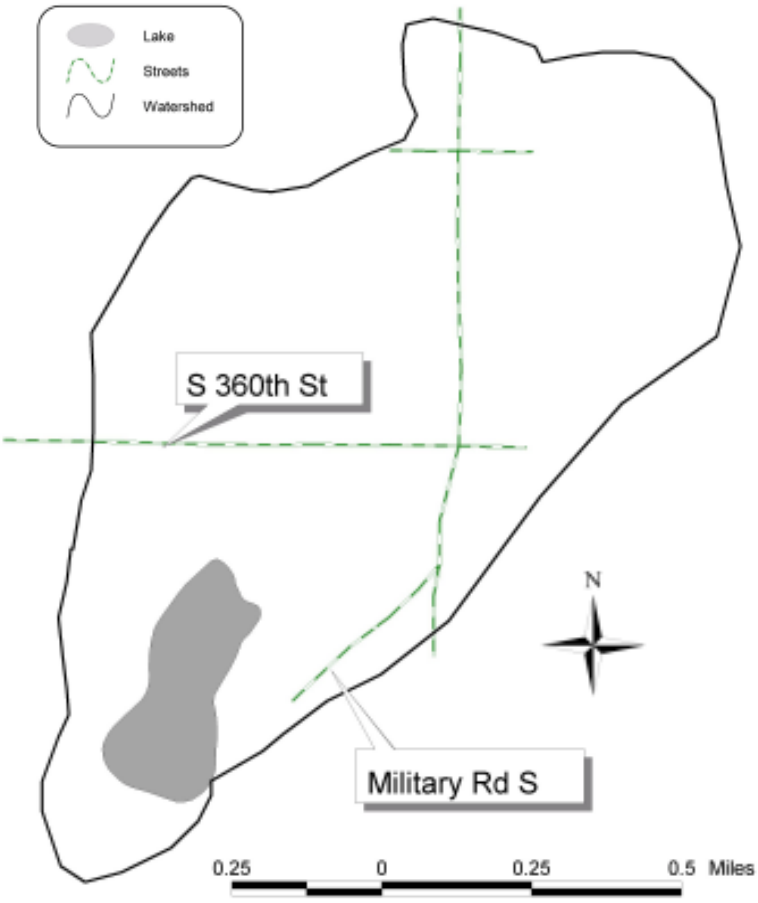


Overview

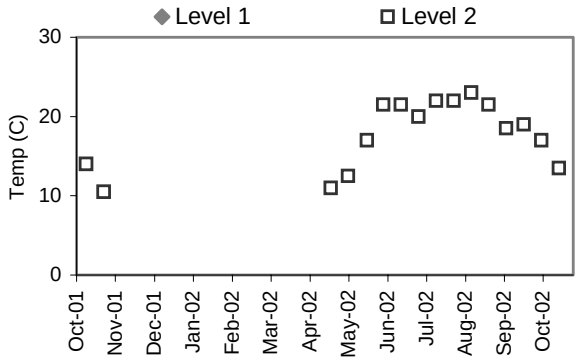
Volunteer monitoring began at Fivemile Lake in the 1980s, and continued through 2002, with a four-year hiatus in the early 1990s. The data collected classify this lake as moderately high in primary productivity (mesotrophic to eutrophic) with fair water quality. The color of the water affects clarity, making the TSI-Secchi considerably higher than the other trophic indicators and impacting the assessment. Since the lake surface makes up only 6% of the drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and groundwater inputs. There are no significant wetlands in the basin, and land use is mostly suburban residential and rural. Enhancement of productivity through human impacts is probably occurring.

Fivemile Lake has no public access boat ramp, but car top boats may be launched from the county park on the eastern shoreline. Residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious aquatic weeds.

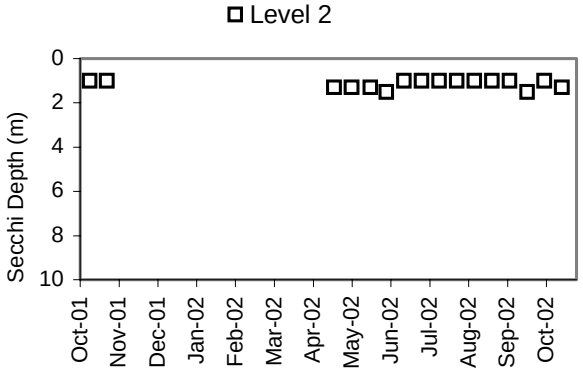
Watershed Map



Lake Temperature



Secchi Depth



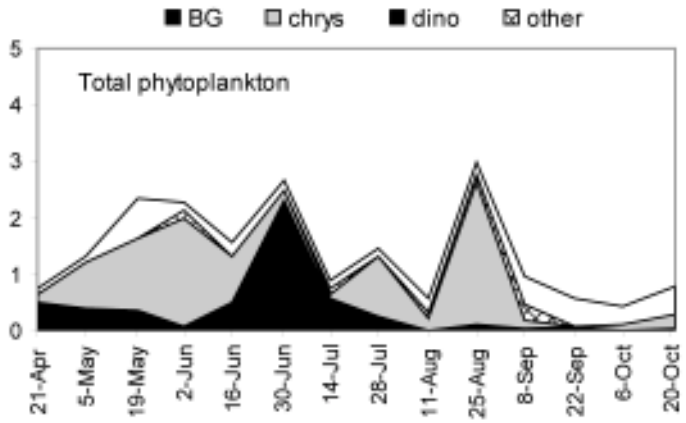
Lake Level and Precipitation

No Data Available

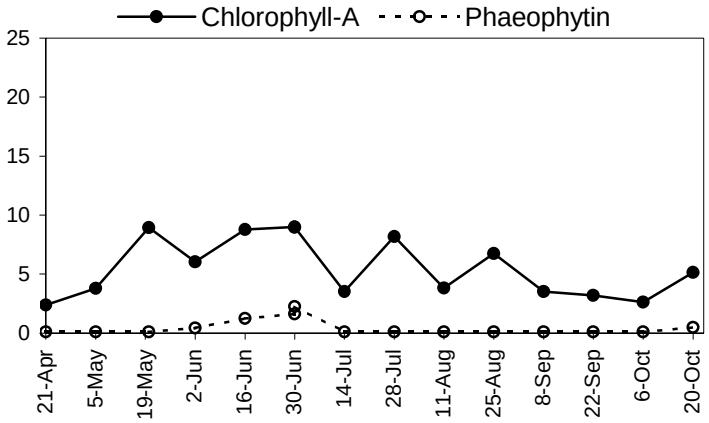
The Secchi transparency during the sampling season was very steady, between 1 and 1.5 m, consistent with the highly colored water. There were no precipitation or water level records for the year. Level II surface water temperatures reached 23 degrees Celsius in August.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations remained moderately low throughout sampling season, with several irregular peaks in biovolume. The most common species present included the chrysophyte *Dinobryon* and the bluegreen *Aphanizomenon*, with the dinoflagellate *Ceratium* present in late summer. Chlorophyll content showed no particular seasonal pattern, but was loosely synchronized with the phytoplankton biovolume estimates.



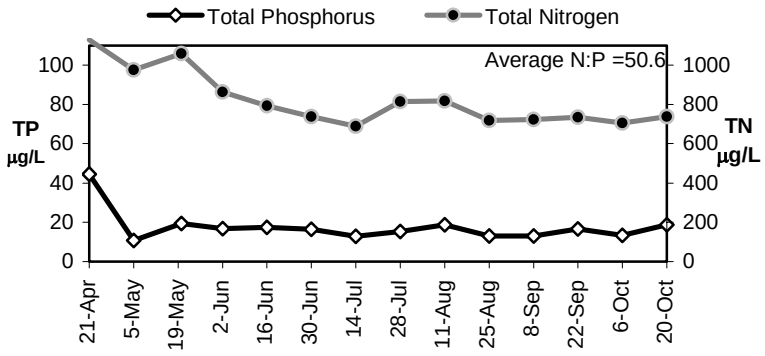
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

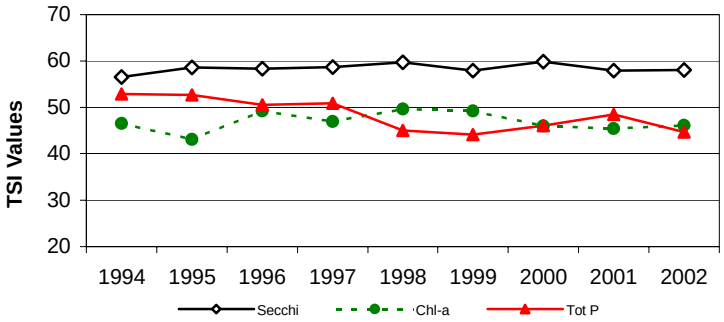


Nutrient Analysis and TSI Ratings

Total nitrogen and phosphorus remained in relatively constant proportion to each other through the sampling period. The N:P ratio ranged from 25 to one value of 90.

In 2002 TSI-Secchi was considerably higher than the other TSI values as it has been in all other years since 1995, suggesting it is probably more affected by water color than by algal biovolume.



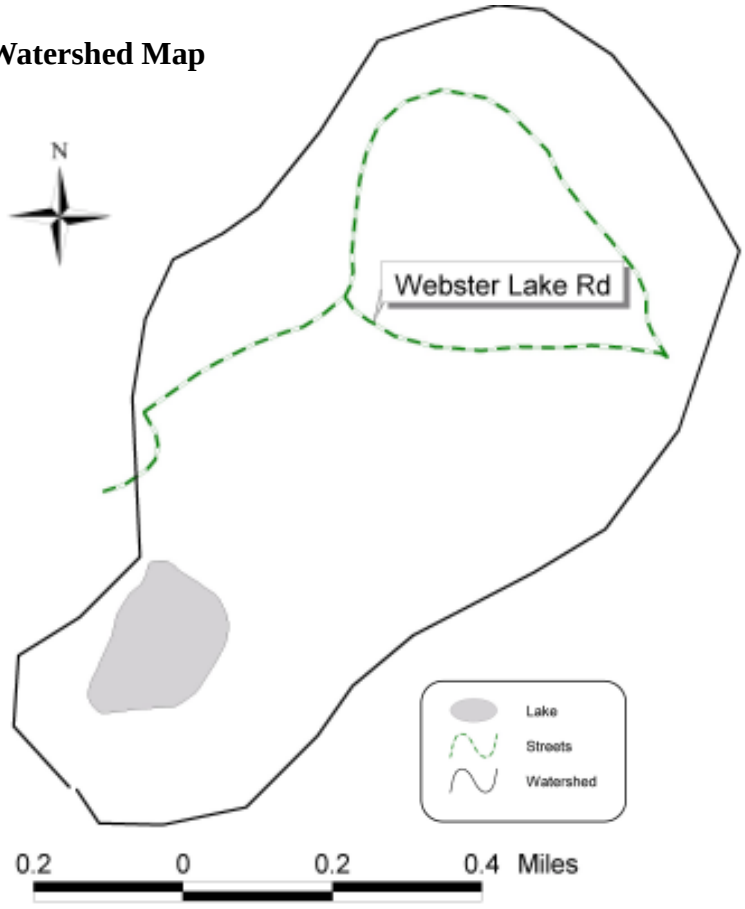


Overview

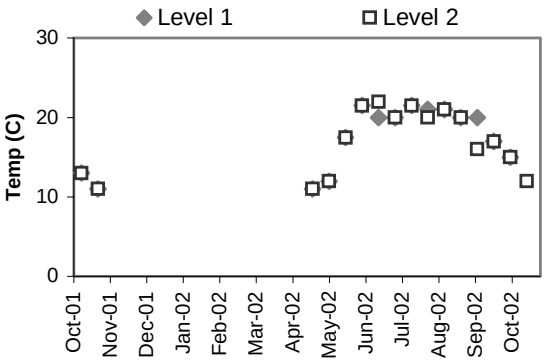
Volunteer monitoring began at Lake Francis in the 1996 and continued through 2002. The data collected suggest that this lake is fairly high in primary productivity (threshold mesotrophic to eutrophic) with good to fair water quality. Since the lake surface makes up 5% of the drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and groundwater inputs. There are several significant wetlands in the basin and much of the lake shoreline is classified as wetland, in addition to water inputs from Webster Lake upstream. Current Land use appears to be mostly as forest and rural residential/small farms.

Lake Francis has no public access, but residents should monitor aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious aquatic weeds.

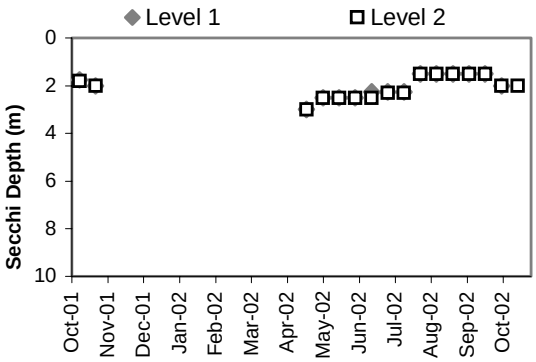
Watershed Map



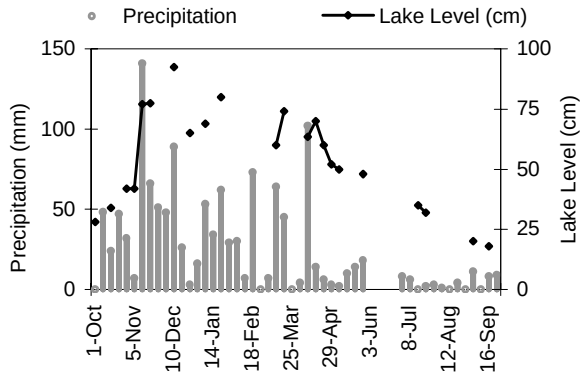
Lake Temperature



Secchi Depth



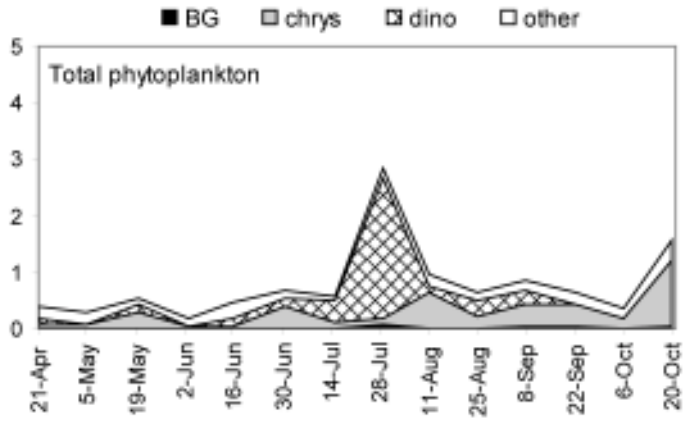
Lake Level and Precipitation



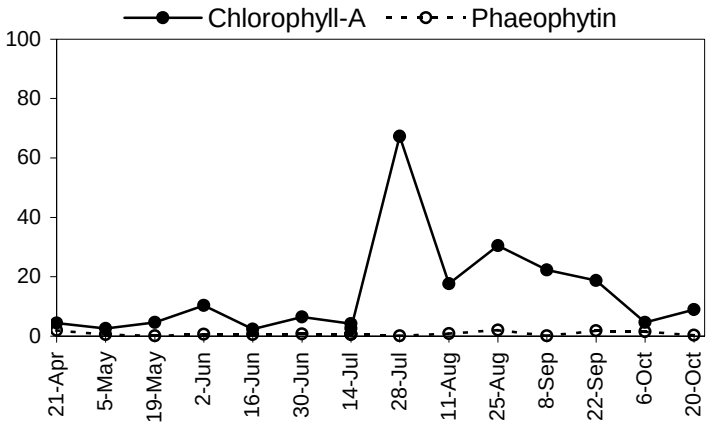
The Secchi transparency during the sampling season was fairly steady, ranging between 1.5 and 3.0m. Water level was recorded for portions of the year, suggesting that it conforms to the winter high – summer low pattern of many regional lakes. Level II surface water temperatures reached a maximum of 22 degrees Celsius in August.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations made a peak in late July, dominated by the dinoflagellate *Ceratium*. Other important species included the chlorophytes *Volvox* and *Botryococcus*, as well as the chrysophyte *Dinobryon* and the diatom *Tabellaria*. Chlorophyll content was low through the first part of the season, rising concurrently with the *Ceratium* peak and remaining at a higher level through the rest of the season.



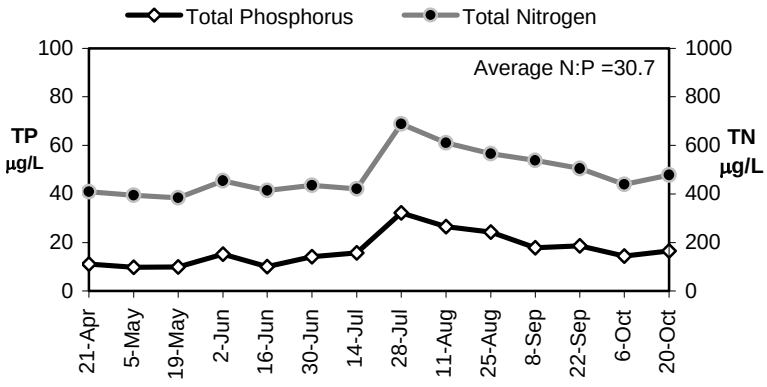
BG = Bluegreen; **chrys** = Chrysophytes;
dino = Dinoflagellates

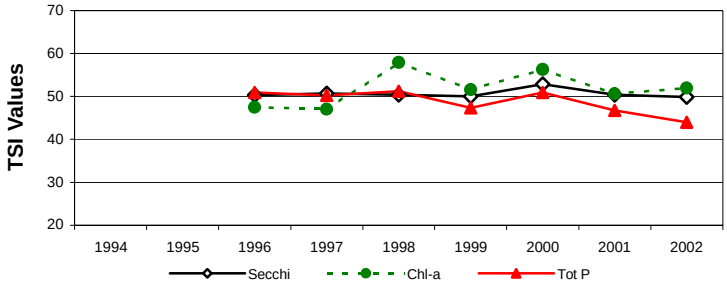


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in close proportion to each other through the sampling period. The N:P ratio ranged from 21 to 41.

In 2002 the TSI-TP was lower than the other two indicators, which were on the threshold between mesotrophy and eutrophy, similar to 2001.



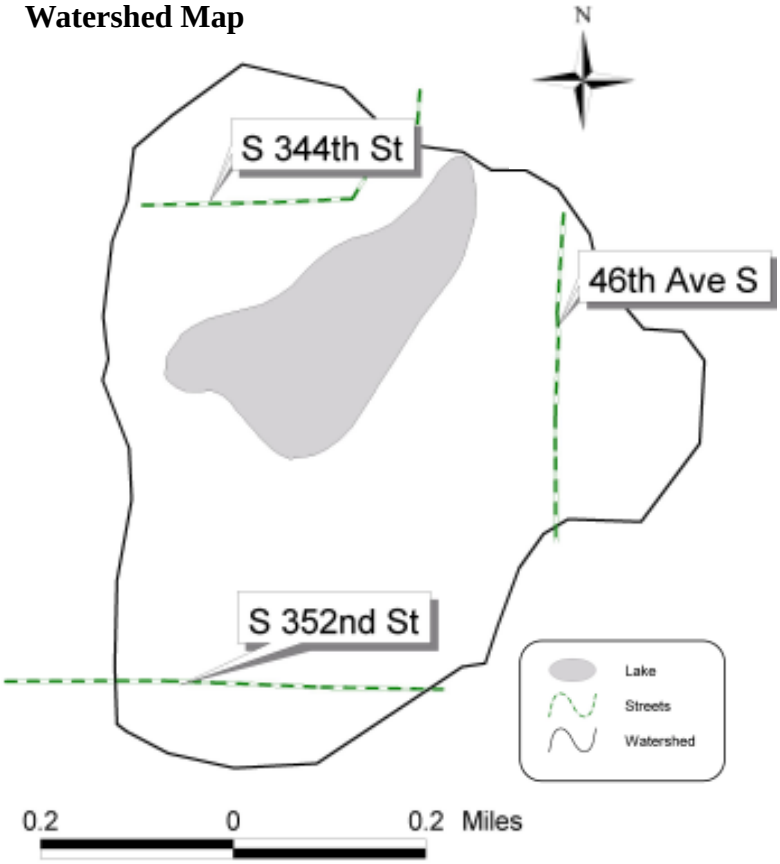


Overview

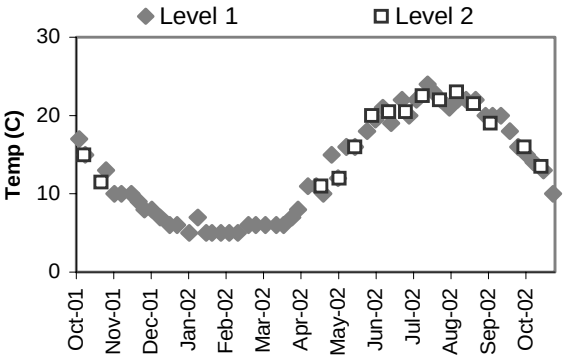
Volunteer monitoring began at Lake Geneva in the 1980s and continued through 2002, with a four-year hiatus in the early 1990s. The data collected suggest that this lake is moderate to low in primary productivity (threshold oligotrophic) with good to excellent water quality. Since the lake surface makes up nearly 13% of the drainage area, direct precipitation is an important water source, in addition to stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use appears to be mostly rural residential/small farms, but is becoming more suburban in character.

Lake Geneva has a public access boat ramp, and residents have funded efforts to control water lilies in the past. Eurasian milfoil has recently been identified in the lake. A close eye should be kept on aquatic plants growing nearshore to monitor its spread, as well as to catch early infestations of Brazilian elodea or other noxious aquatic weeds.

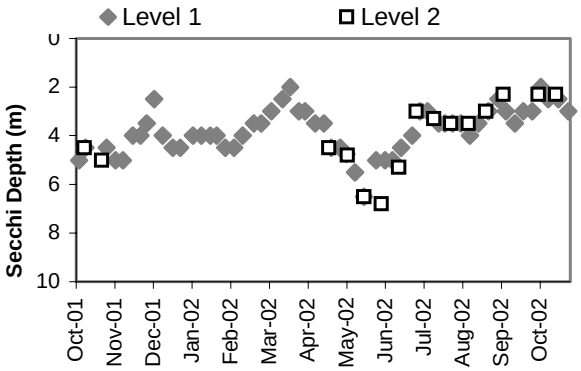
Watershed Map



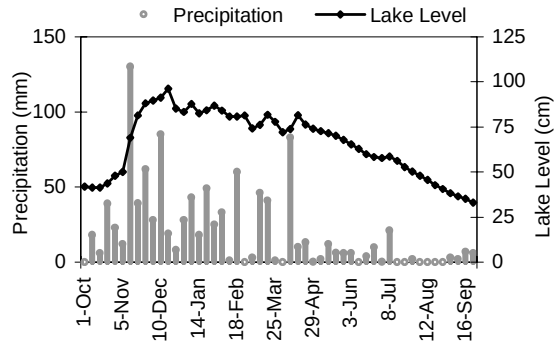
Lake Temperature



Secchi Depth



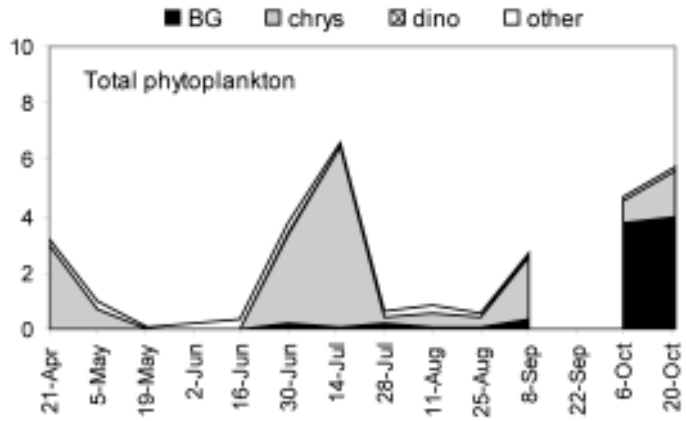
Lake Level and Precipitation



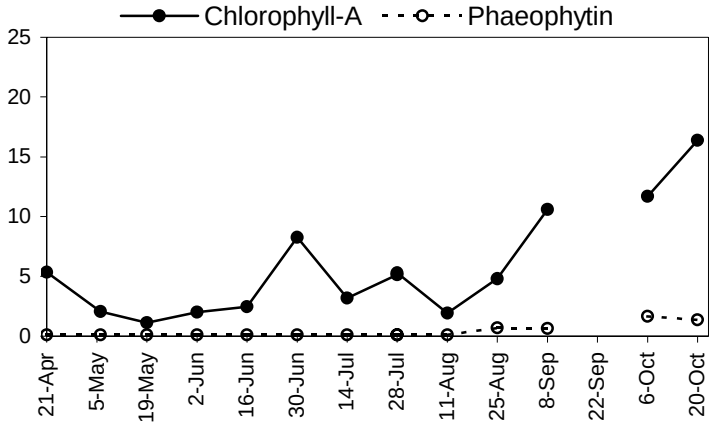
Secchi transparency ranged between 2.0 and 6.8m through the year. Excellent records were available for water levels and precipitation. Water levels were consistent with the general pattern of winter high - autumn low stands. Annual surface water temperatures ranged between 5 and 24 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations fluctuated between low values and moderately high peaks, which were made by several species of the chrysophyte *Dinobryon*. In the fall, the bluegreens *Anabaena* and *Aphanizomenon* became dominant, although *Dinobryon* also remained common. Chlorophyll content tracked the pattern of the phytoplankton populations reasonably well through the season, although the peak of *Dinobryon* in mid-summer produces less chlorophyll than the phytoplankton population in the fall.



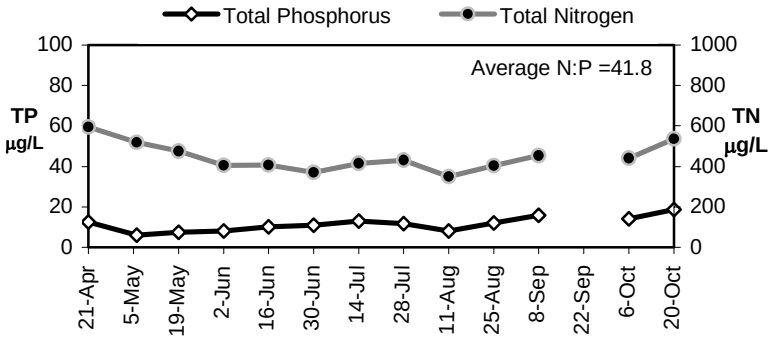
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

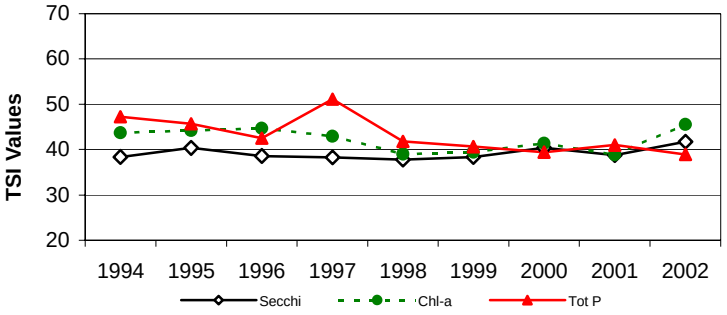


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in reasonably constant proportion to each other through the sampling period. The N:P ratio ranged from 28 to 85.

In 2002 the three TSI indicators were fairly close to each other, slightly above the threshold between oligotrophy and mesotrophy, a little higher than the last four years of the record, but below 1994 - 1997.



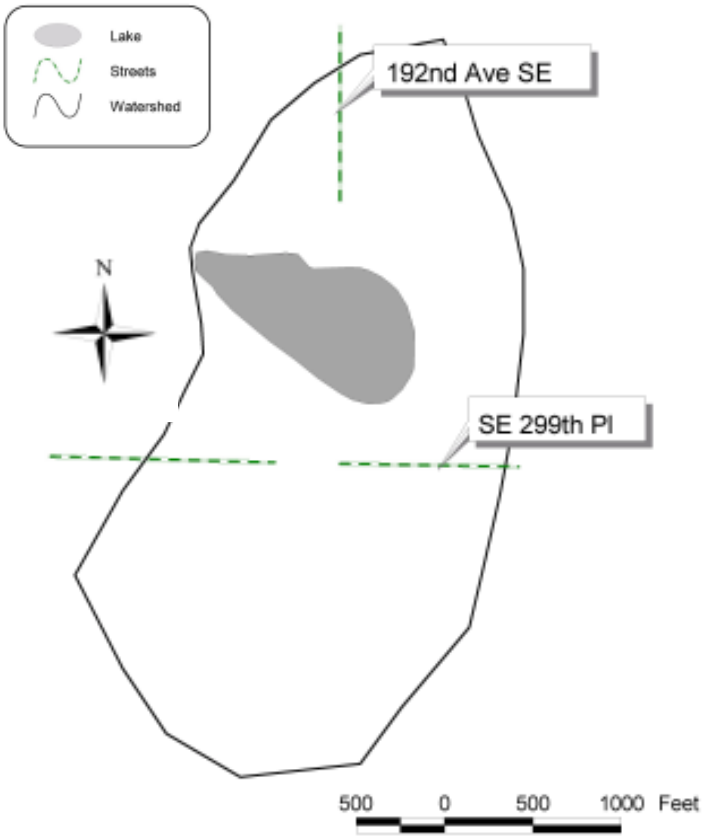


Overview

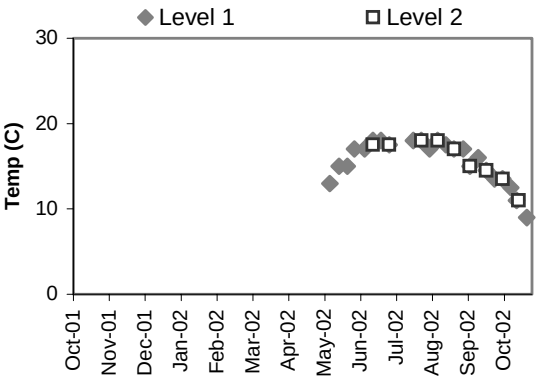
Volunteer monitoring began at Grass lake in 2002, producing the first information for this lake in the Lake Stewardship Program. The collected data suggest that this lake is high in primary productivity (eutrophic) with fair water quality. Since the lake surface makes up 9% of the drainage area, direct precipitation is of lesser importance relative to stormwater runoff and groundwater inputs. There are several wetlands in the basin, including much of the land adjacent to the lake. Current land use appears to be mostly rural residential/small farms, but is becoming more suburban in character.

Grass lake has no public access boat ramp, but residents should monitor aquatic plants growing nearshore to catch early infestations of Eurasian watermilfoil, Brazilian elodea or other noxious aquatic weeds.

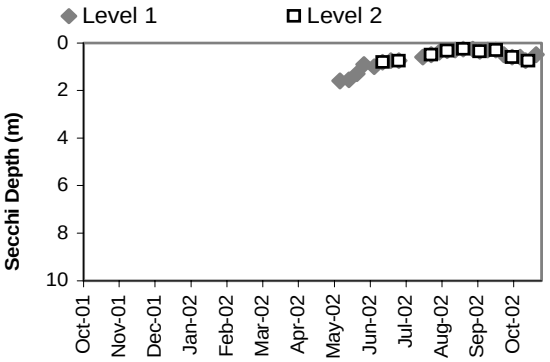
Watershed Map



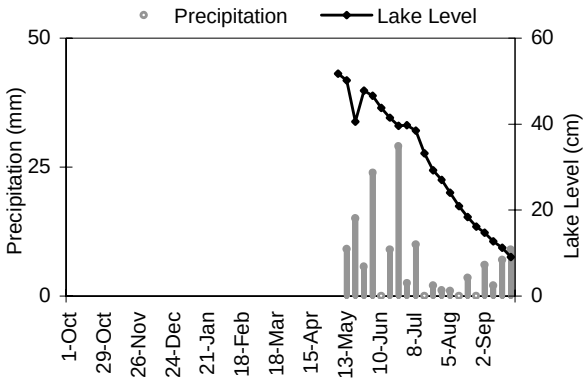
Lake Temperature



Secchi Depth



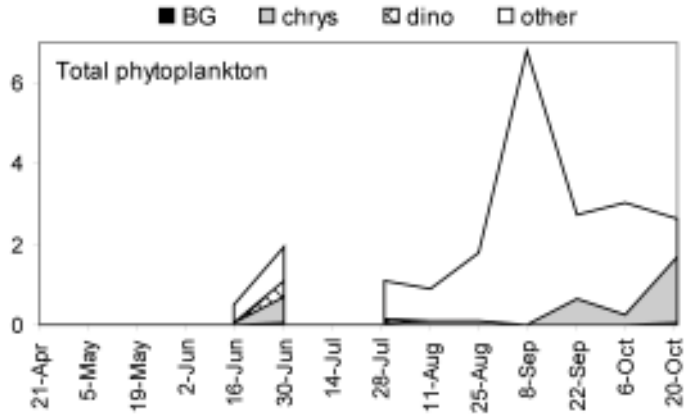
Lake Level and Precipitation



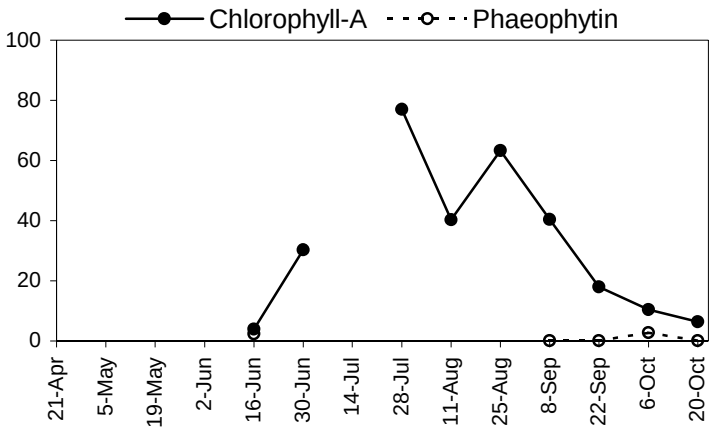
Secchi transparency ranged between 0.3 and 1.6m from May through October. Records for water levels and precipitation began in May. Water levels were consistent with the general pattern of winter high - autumn low stands. Surface water temperatures ranged between 9 and 18 degrees Celsius during the same interval.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations fluctuated between low to moderate values, with a peak in early September made by several cryptophyte species and an unidentified colonial species. Chlorophyll content did not track the pattern of the phytoplankton populations in mid season. The high total chlorophyll values were accompanied by large amounts of chlorophyll B, which suggested that bits of plants other than planktonic algae were being incorporated into the samples. This is quite possible since much of Grass Lake is colonized by aquatic plants.



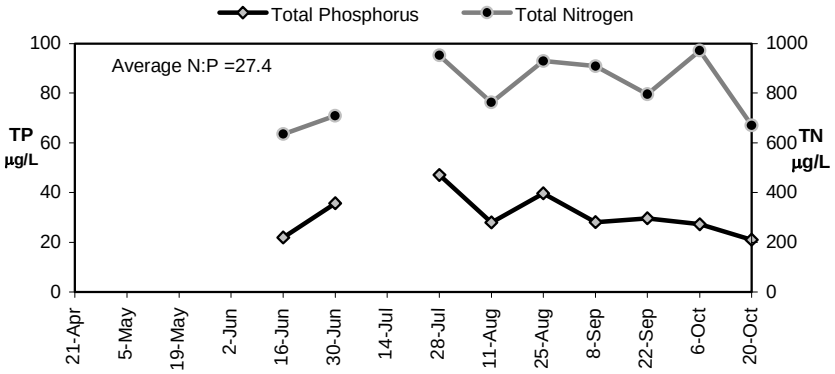
BG = Bluegreen; **chrys** = Chrysophytes;
dino = Dinoflagellates

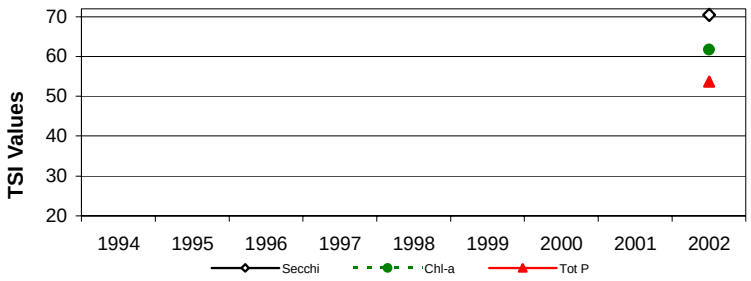


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in reasonably constant proportion to each other through the sampling period. The N:P ratio ranged from 20 to 36.

In 2002 the three TSI indicators were all above the threshold for eutrophy, although not in precise agreement with each other. The TSI-Secchi was particularly high.



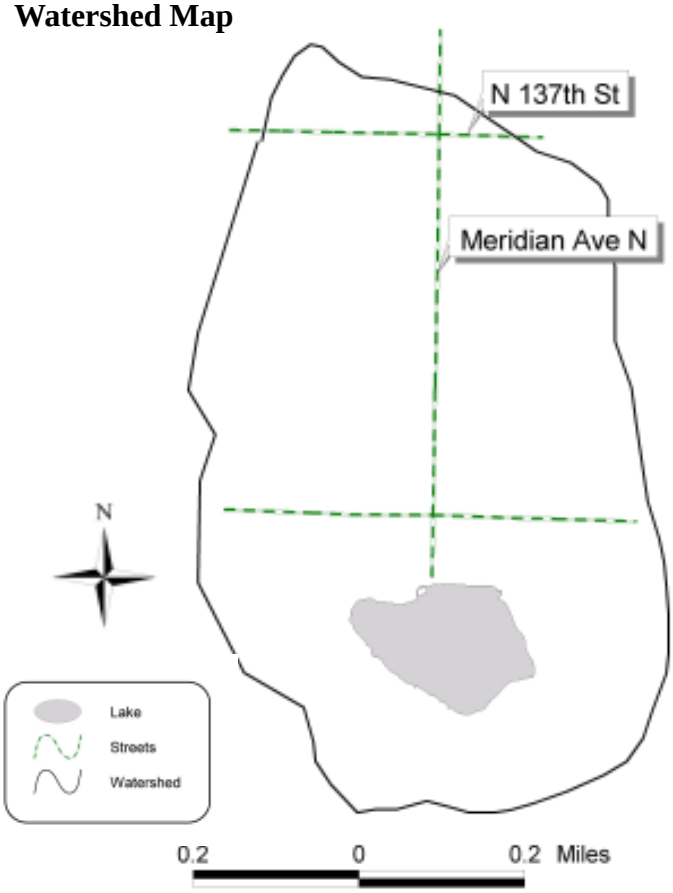


Overview

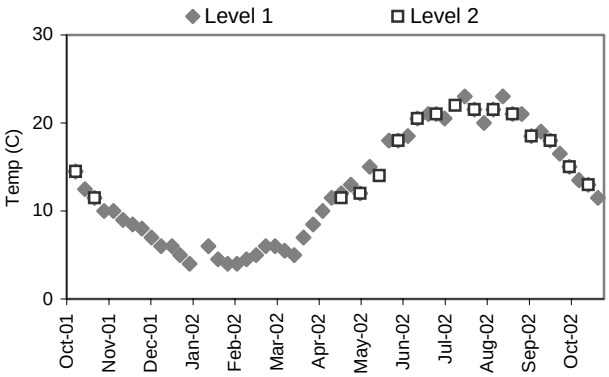
Volunteer monitoring began at Haller Lake in the 1997 and continued through 2002. The data collected suggest that this city lake (Seattle) is moderate in primary productivity (mesotrophic), with good water quality. Since the lake surface makes up approximately 5% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use is mostly urban residential, with a high school included in the basin.

Haller Lake has two public access street ends where boats may be hand launched. Residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea, or other noxious weeds.

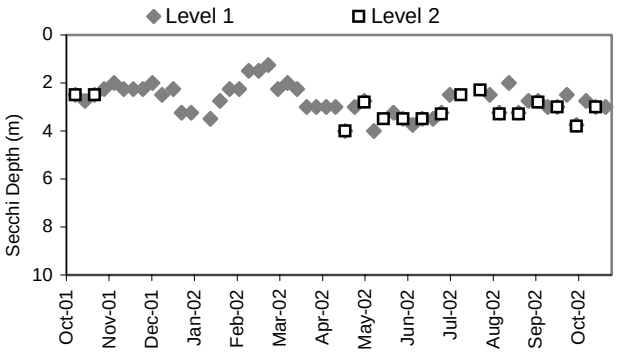
Watershed Map



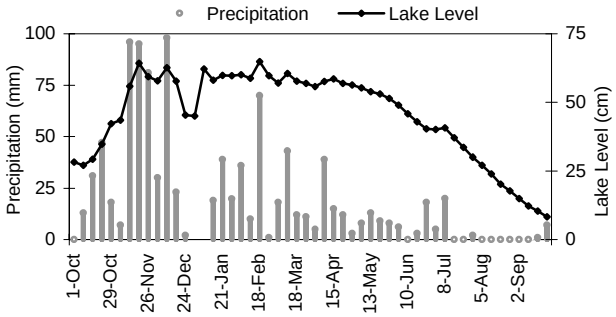
Lake Temperature



Secchi Depth



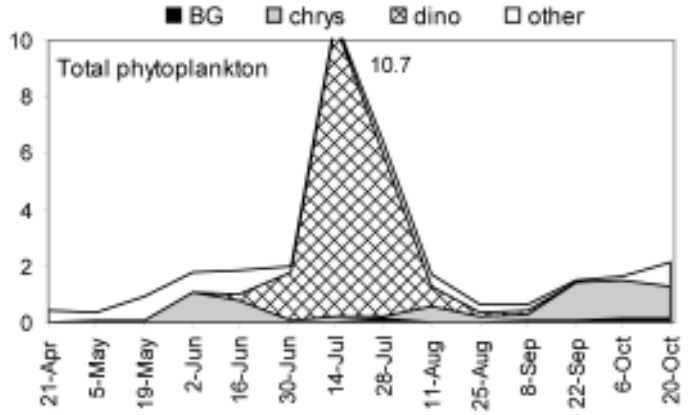
Lake Level and Precipitation



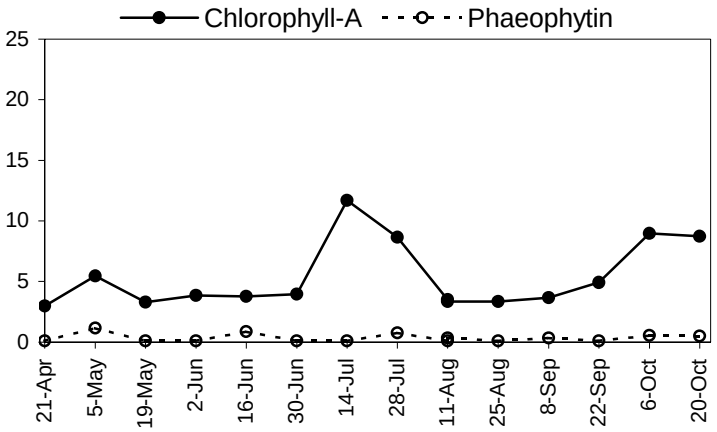
Secchi transparency ranged between 1.3 and 6.0m through the year. Water levels were consistent with the general pattern of winter high - autumn low stands. Annual surface water temperatures ranged between 4.0 and 23.0 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

The phytoplankton made a major peak in July, dominated by the dinoflagellate *Ceratium*. Algal biovolumes were low to moderate for the rest of the sampling season, including the chrysophyte *Dinobryon* and several species of chlorophyte algae. Chlorophyll content tracked the pattern of the phytoplankton populations reasonably well through the season.



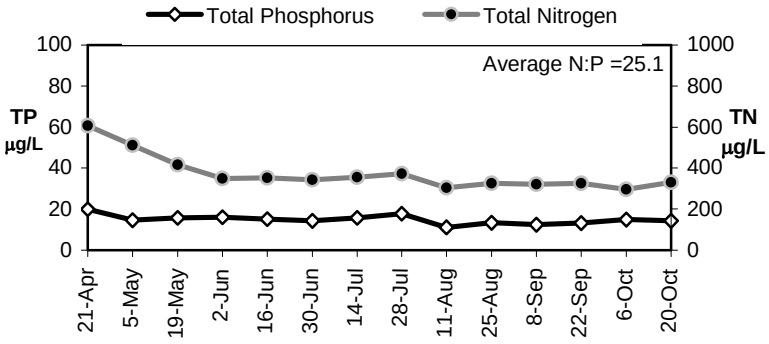
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

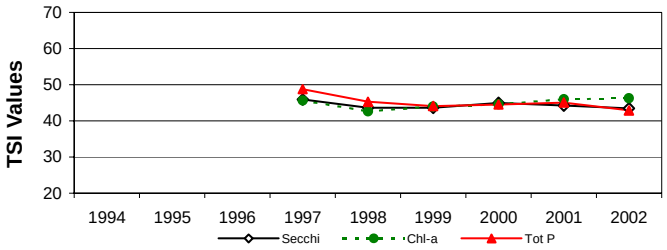


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in fairly constant proportion to each other through most of the sampling period, with nitrogen higher in the spring. The N:P ratio ranged from 20 to 35.

In 2002 the three TSI indicators were fairly close to each other in the midrange for mesotrophy, similar to the other years in the record.





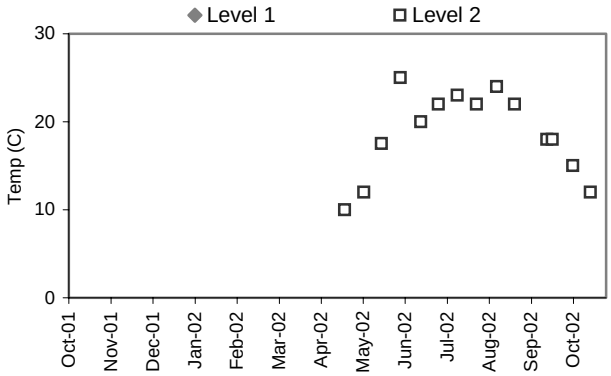
Overview

Volunteer monitoring began at Horseshoe Lake in water year 1999 and has continued through the present. Level 2 data was collected during the May – October 2002 season. The data collected suggest that this rural lake is moderate in primary productivity (mesotrophic), with good water quality. Since the lake surface makes up approximately 5% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater inputs. Current land use is mixed suburban residential and cleared, undeveloped property.

Horseshoe Lake has no public access boat launch, and widely fluctuating water levels may make invasion by noxious aquatic weeds unlikely over the long term.

Watershed Map

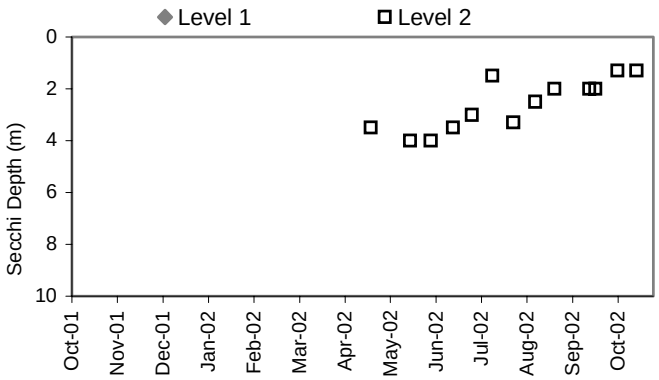
Lake Temperature



Lake Level and Precipitation

No Data Available

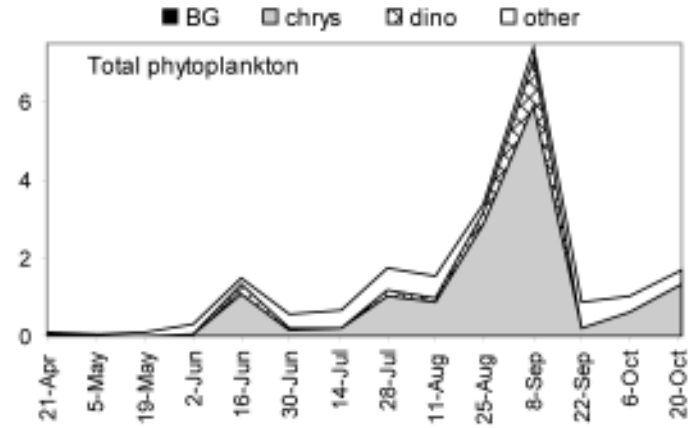
Secchi Depth



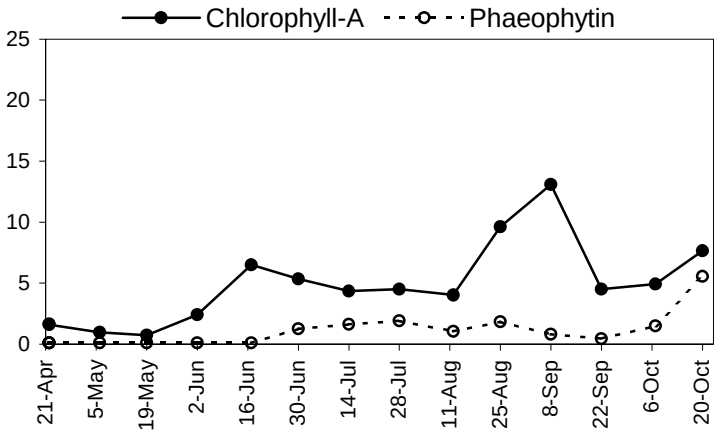
Secchi transparency ranged between 1.3 and 4.0m through the sampling season, while surface water temperatures ranged between 10.0 and 25.0 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

The phytoplankton made one small peak in mid-June, followed by a much larger one in September. The early peak was caused by the chrysophyte *Gloeobotrys*, while the autumn peak was dominated by the chrysophyte *Dinobryon*. Algal biovolumes were low to moderate for the rest of the sampling season, including several species of dinoflagellates and chlorophyte algae. Chlorophyll content tracked the pattern of the phytoplankton populations reasonably well through the season.



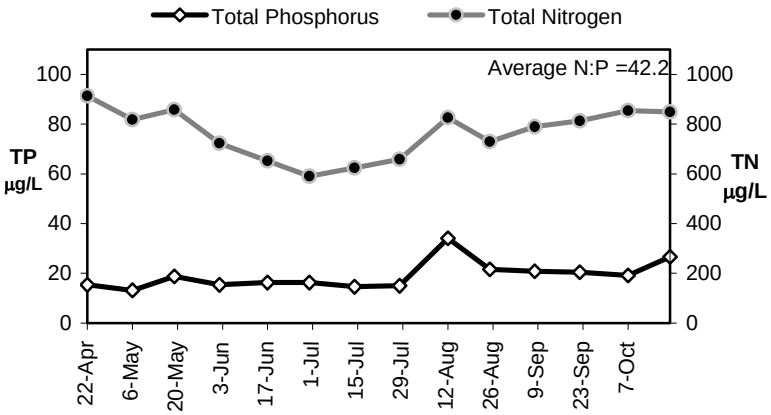
BG = Bluegreen; **chrys** = Chrysophytes;
dino = Dinoflagellates

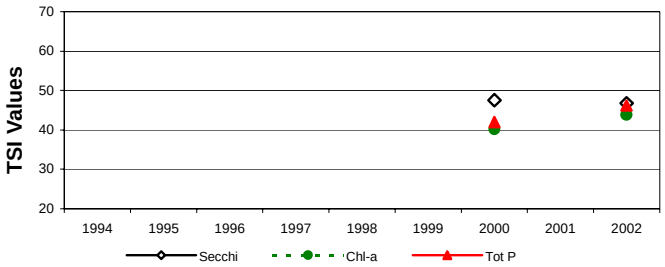


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in fairly constant proportion to each other through most of the sampling period. The N:P ratio ranged from 24 to 62, unfavorable for bluegreen growth.

In 2002 the three TSI indicators were very close to each other in the midrange for mesotrophy, generally similar to the case in 2000.



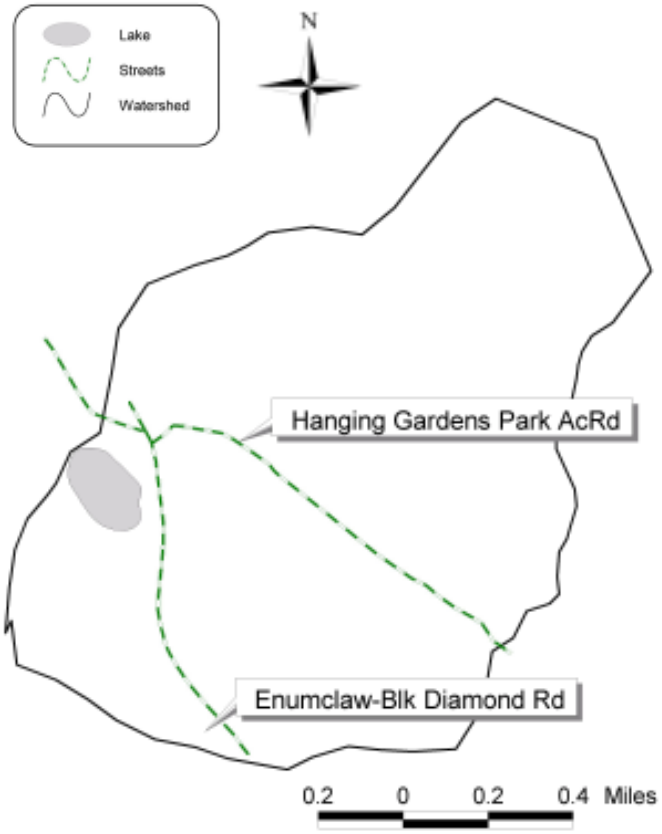


Overview

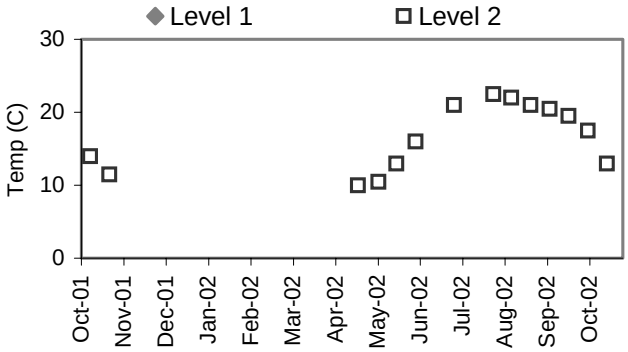
Volunteer monitoring began at Jones Lake in 2000 and continued through 2002. The data collected suggest that this city lake (Black Diamond) is moderate to high in primary productivity (mesotrophic to eutrophic), with good to fair water quality. Since the lake surface makes up only 3% of the drainage area, direct precipitation is less important than inlet streams, storm-water runoff and groundwater inputs. There is one designated wetland in the basin. Current land use is mostly rural, with little urban development to date.

Jones Lake currently has no public access points, but residents should keep an eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious weeds.

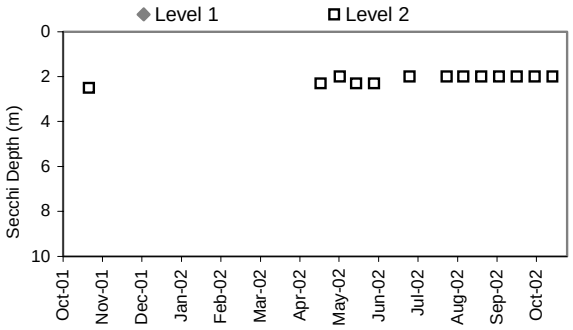
Watershed Map



Lake Temperature



Secchi Depth



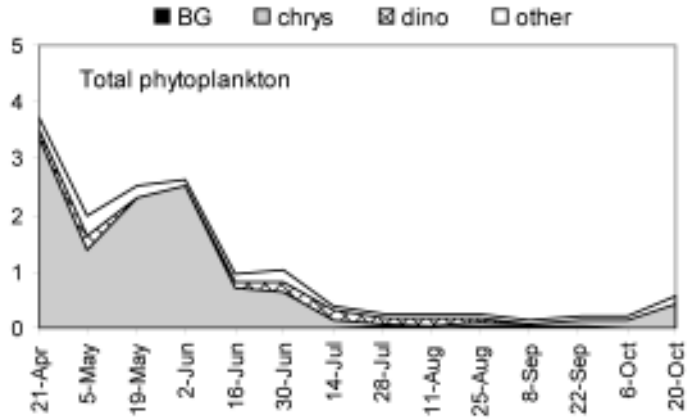
Lake Level and Precipitation

No Data Available

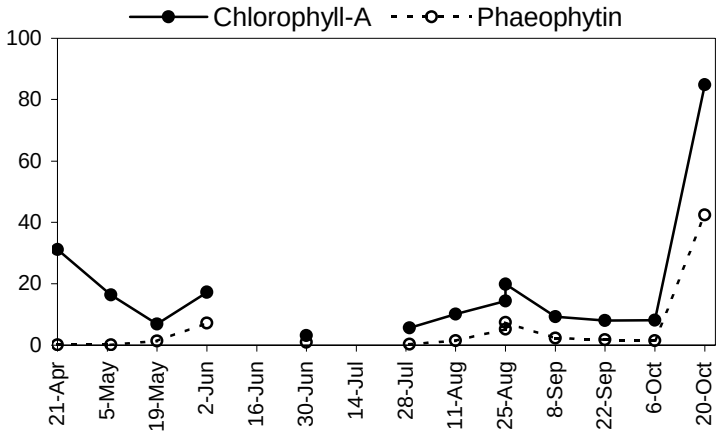
Secchi transparency was stable, ranging between 2.0 and 2.5m through the Level II sampling season. There were no precipitation or water levels records for the year. Level II surface water temperatures reached a maximum of 22.5 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations were low to moderate through most of the season, with the exception of May 19th and October 20th. On both dates, large amounts of bottom dwelling algae were picked up in the algae samples. Dominant algae included filamentous chlorophytes such as *Spirogyra* and *Mougeotia*, which often grow on the lake bottom, as well as benthic chrysophyte diatom species. Chlorophyll content remained low to moderate until the end of October, not reflecting the peak in May. The high chlorophyll value on October 20th was accompanied by large amounts of phaeophytin (degraded chlorophyll) as well.

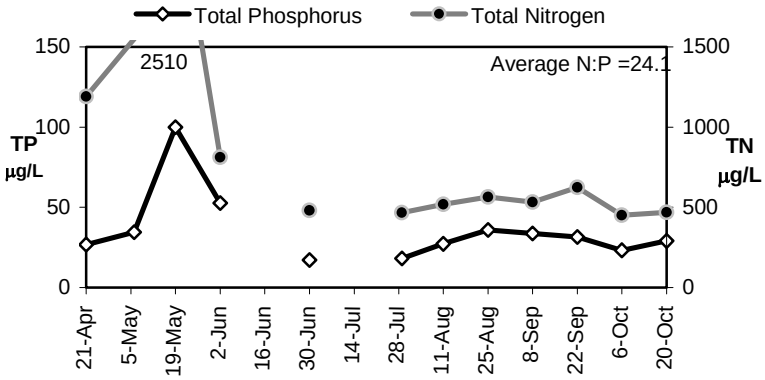


BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

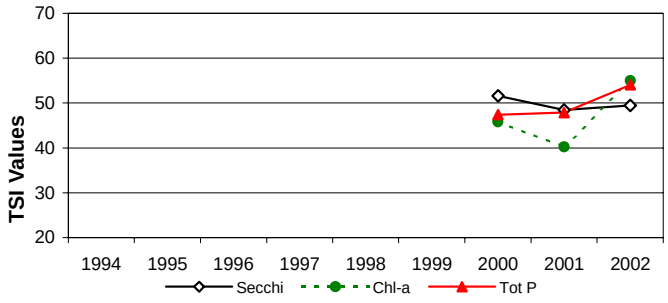


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen were in similar proportions to each other during the second half of the sampling season. The first 3 samples of the period had much higher nitrogen, and both parameters were very high on May 19th, when bottom sediments were likely incorporated. However, for all dates the N:P ratio ranged from 15 to 45, which is not an unusually large spread.



In 2002 the TSI-Secchi was similar to 2001, while the other two indicators were higher, putting the lake at the threshold of eutrophic conditions.

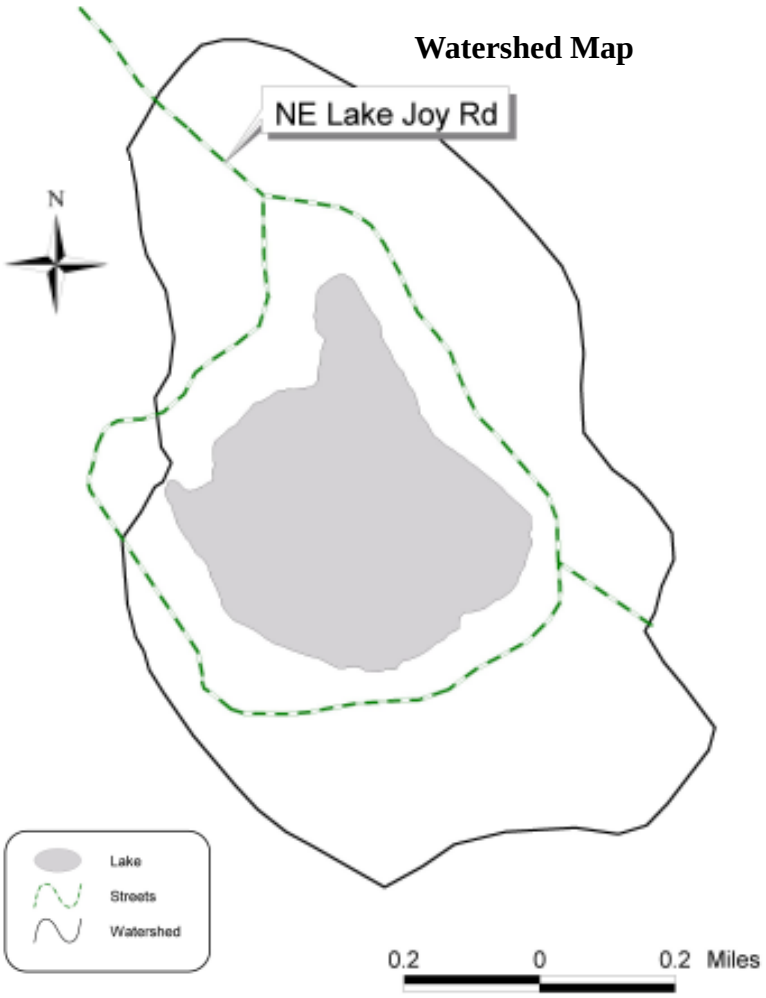


Overview

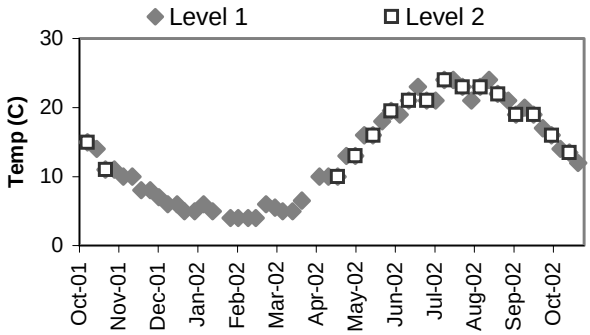
Volunteer monitoring began at Lake Joy in 2000 and continued through 2002. The data collected suggest that this lake is low to moderate in primary productivity (oligotrophic to mesotrophic), with excellent to good water quality. Since the lake surface makes up 22% of the drainage area, direct precipitation is important, in addition to inlet streams, stormwater runoff and groundwater inputs. There are no designated wetlands in the basin. Current land use is mostly rural, with homes concentrated around the shoreline.

Lake Joy has only a walk-in public access point, but residents should keep an eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious weeds.

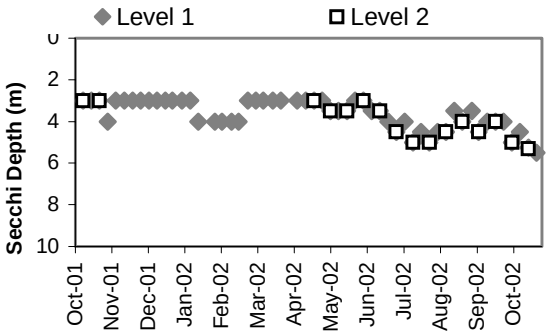
Watershed Map



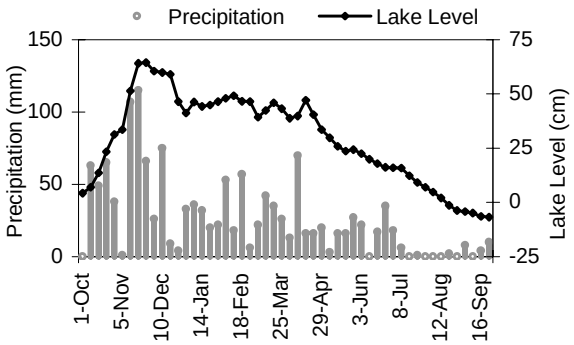
Lake Temperature



Secchi Depth



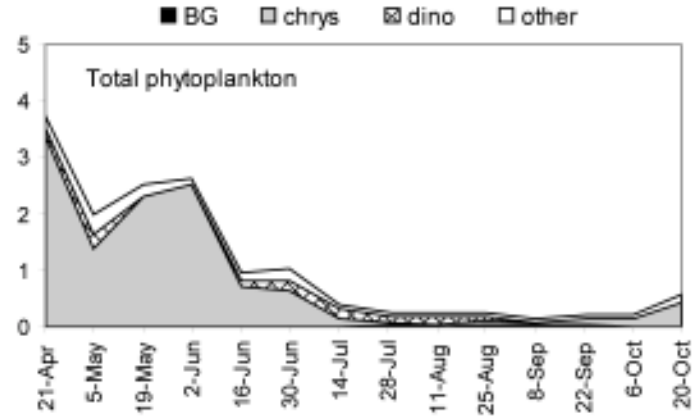
Lake Level and Precipitation



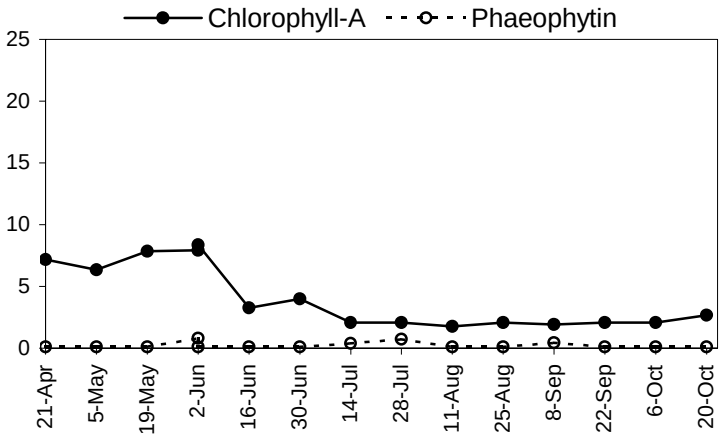
Secchi transparency was ranged between 3.0 and 5.5m. Complete records of water level and precipitation were kept. Water levels followed the general pattern of winter high – autumn low stands. Annual surface water temperatures ranged between 4 and 24 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations were highest in the beginning of the sample season, dominated first by the chrysophyte *Dinobryon*, followed by the diatom *Cyclotella*. A wide variety of species present in low concentrations characterized the remainder of the sampling period. Chlorophyll content tracked the phytoplankton counts closely.



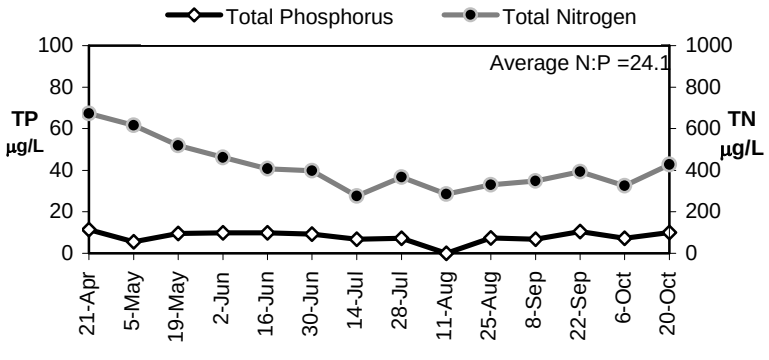
BG = Bluegreen; **chrys** = Chrysophytes;
dino = Dinoflagellates

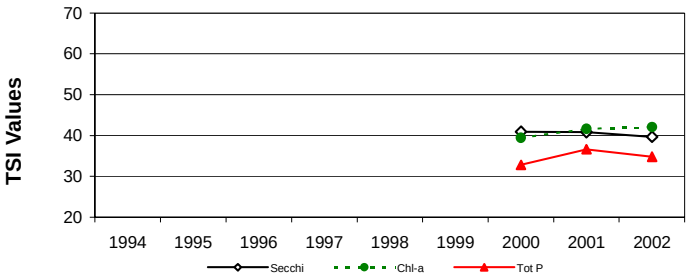


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in similar proportion to each other after the first several dates of the sampling period, when nitrogen was high. The N:P ratio ranged from 37 to 112.

In 2002 the TSI-TotP was significantly lower than the other two indicators, which were at the high end of mesotrophy similar to past years.



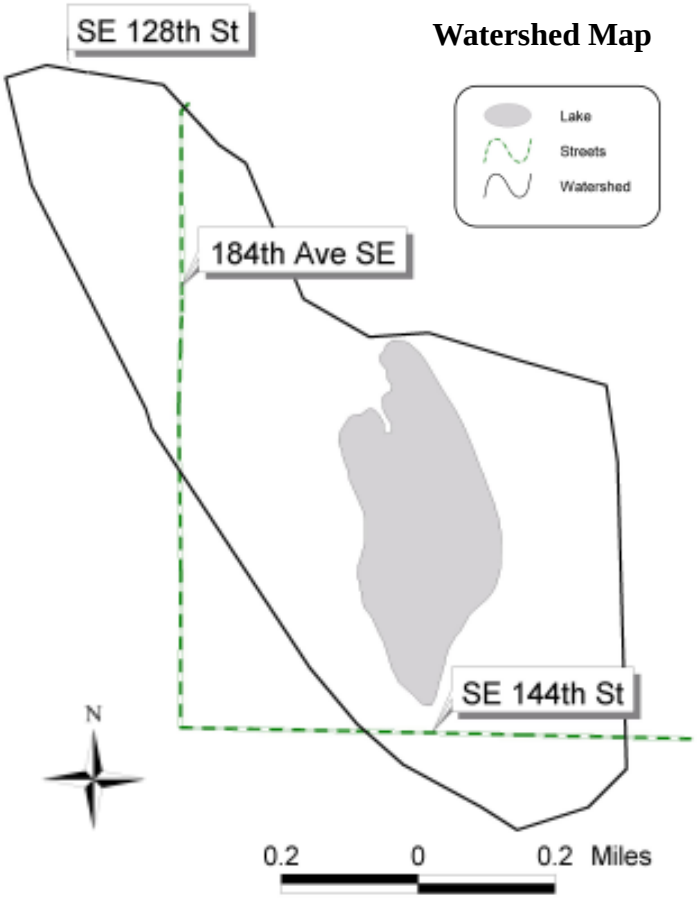


Overview

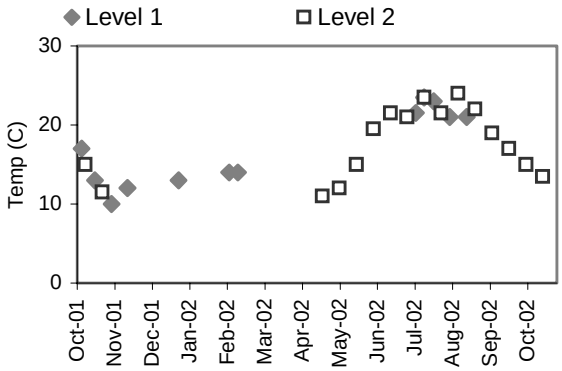
Volunteer monitoring began at Lake Kathleen in 1996 and continued through 2002. The data collected suggest that this lake is moderate to high in primary productivity (mesotrophic to eutrophic) with good to fair water quality. Since the lake surface makes up 12% of the drainage area, direct precipitation is less important than inlet streams, stormwater runoff, and groundwater inputs. There are designated wetlands in the basin, including two along the lake shoreline. Current land use is mixed rural and suburban residential.

Lake Kathleen has no public boat launch, but residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea, or other noxious weeds.

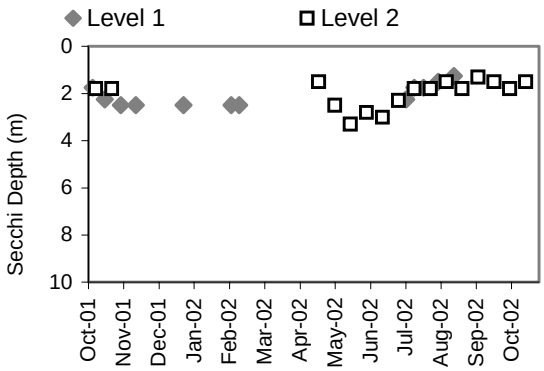
Watershed Map



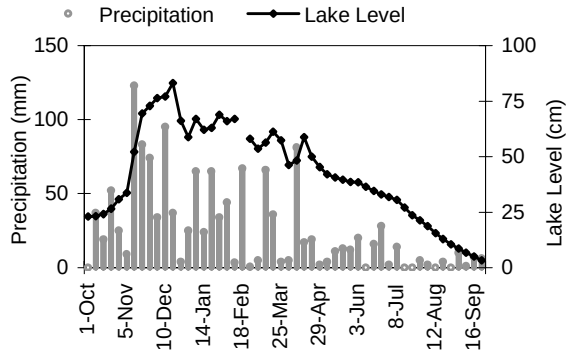
Lake Temperature



Secchi Depth



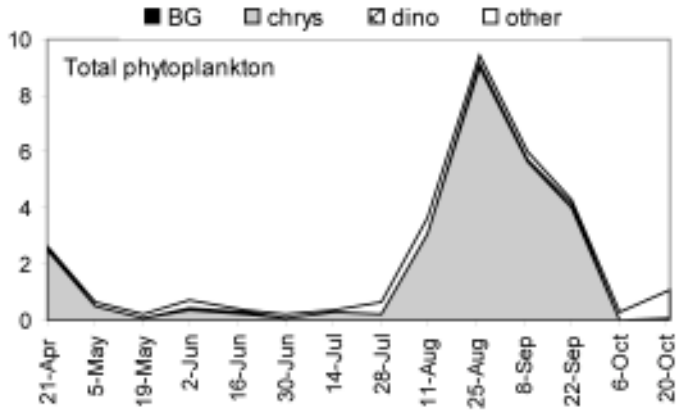
Lake Level and Precipitation



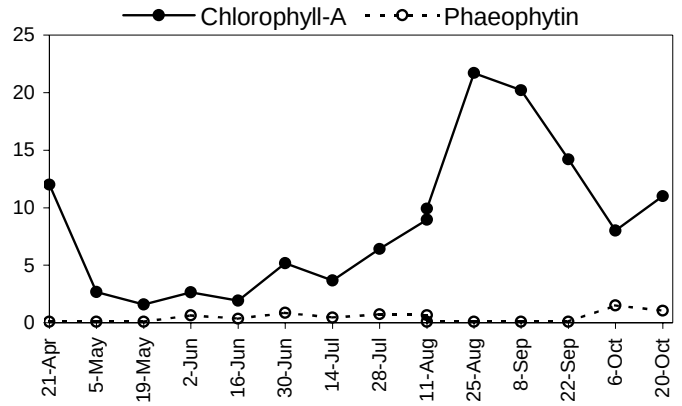
Secchi transparency measurements ranged between 1.0 and 4.0m through the year, with some gaps in the record. Water levels followed the general pattern of winter high – autumn low stands. The maximum surface water temperature reached 24.0 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

The phytoplankton Made a large peak in August and September, dominated by the chrysophyte *Dinobryon*. Other important species included the euglenophyte *Trachelomonas* and several species of cryptophytes. Chlorophyll generally followed the phytoplankton population curves.



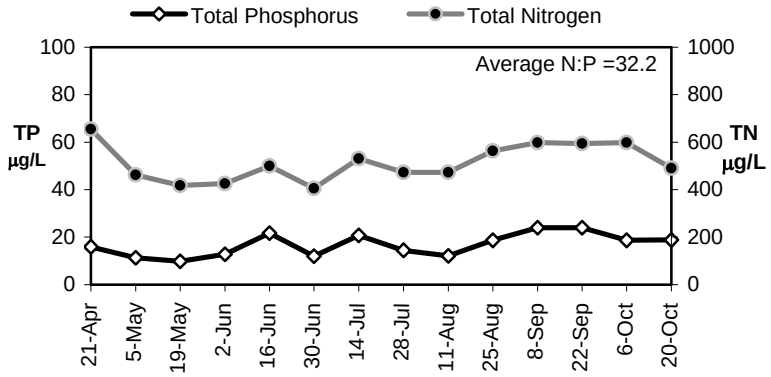
BG = Bluegreen; **chrys** = Chrysophytes;
dino = Dinoflagellates

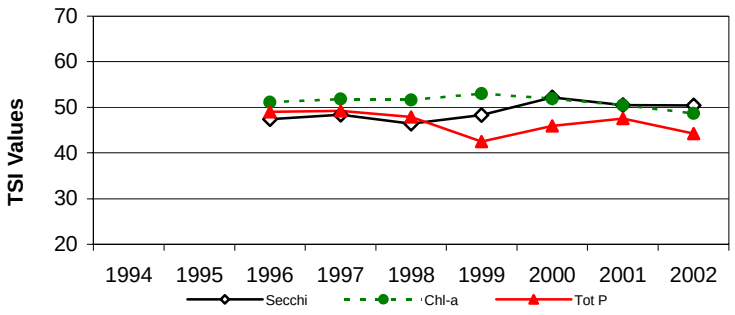


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period. The N:P ratio ranged from 23 to 43, remaining stable similar to 2001.

In 2002 the TSI-TP value was lower than the other two, similar to the three previous years. As a whole, the lake appeared to be at the threshold between mesotrophy and eutrophy.



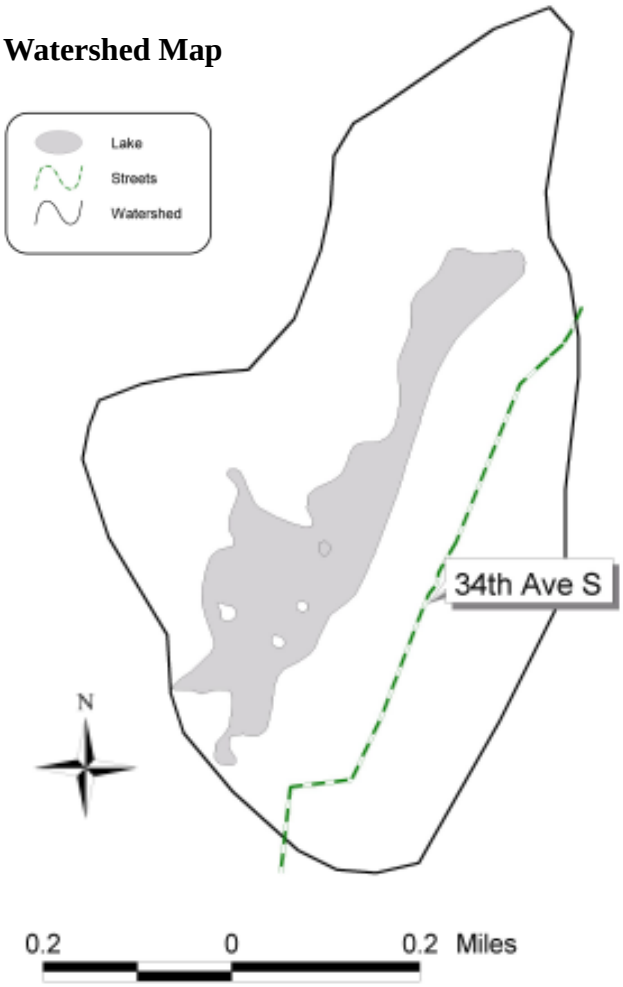


Overview

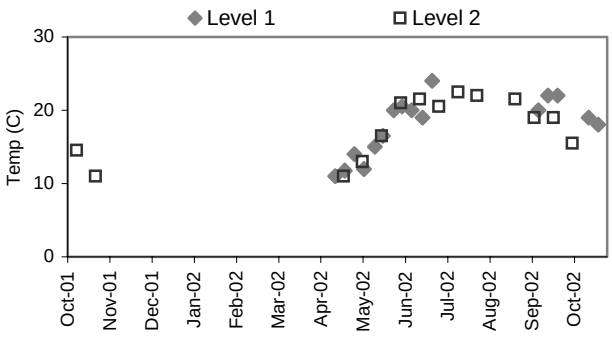
Volunteer monitoring began at Lake Killarney in the late 1980s and continued through 2002. The data collected suggest that this lake, whose northwestern shoreline is in the city of Federal Way, is relatively high in primary productivity (borderline eutrophic) with fair to good water quality. Since the lake surface makes up 20% of the drainage area, direct precipitation is important, in addition to stormwater runoff, and groundwater inputs. There are no designated wetlands in the basin, although the northern shoreline has some wetland functions (King County, 1997). Current land use is largely residential, with several large office complexes developed in the city portion of the basin.

Lake Killarney has a public boat launch and has been heavily infested with milfoil in the past. Though initial herbicide treatments were considered successful, residents should keep an eye on aquatic plants growing nearshore to catch early new infestations of Eurasian milfoil, Brazilian elodea, or other noxious weeds.

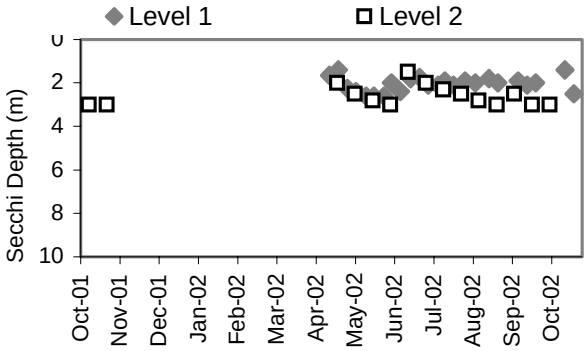
Watershed Map



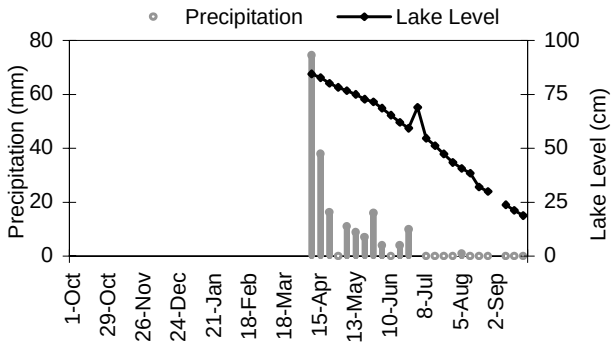
Lake Temperature



Secchi Depth



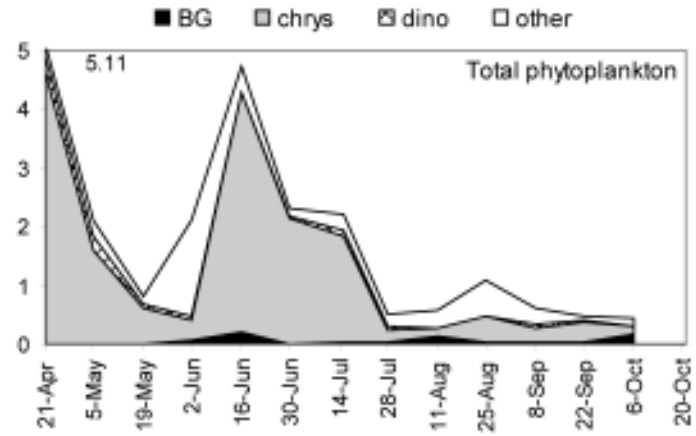
Lake Level and Precipitation



Secchi transparency ranged between 1.4 and 3.0m through the sample season. Water level and precipitation data was incomplete for the year, but suggested a winter high – summer low stand pattern. Level II surface water temperatures reached 24 degrees Celsius.

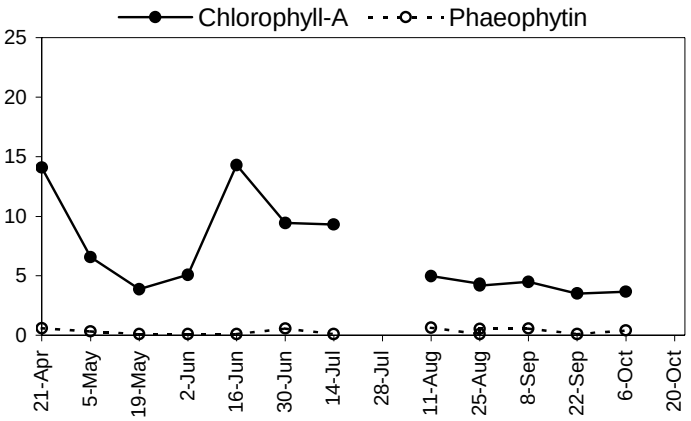
Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations were moderate, making two peaks early in the sampling season, dominated by the chrysophyte diatom *Asterionella* and by *Dinobryon*. Other species present included the diatom *Fragilaria* and several species of chlorophytes. Chlorophyll content generally followed the phytoplankton volumes.



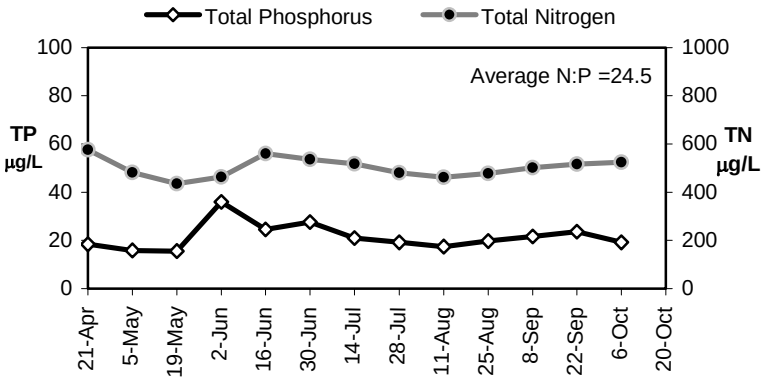
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

Residents on Lake Killarney have been involved with algae control efforts in the past, including the use of copper-based algaecides to control blooms. Copper has been found in high concentrations in the bottom sediments (King County, 1997).

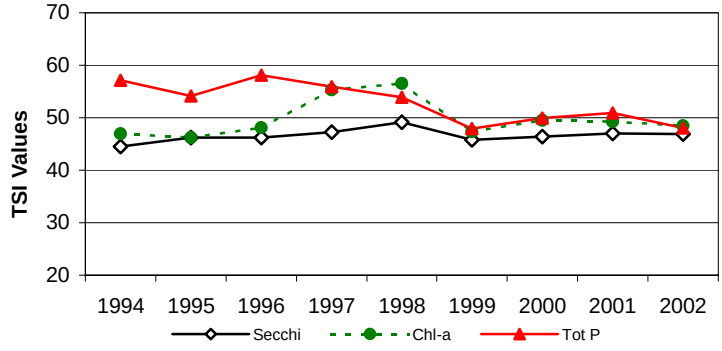


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from June 2nd which had a higher value for phosphorus. The N:P ratio ranged from 13 to 31, at times potentially good conditions for bluegreens.



In 2002 the three TSI values were close to each other, just below the threshold between mesotrophy and eutrophy.

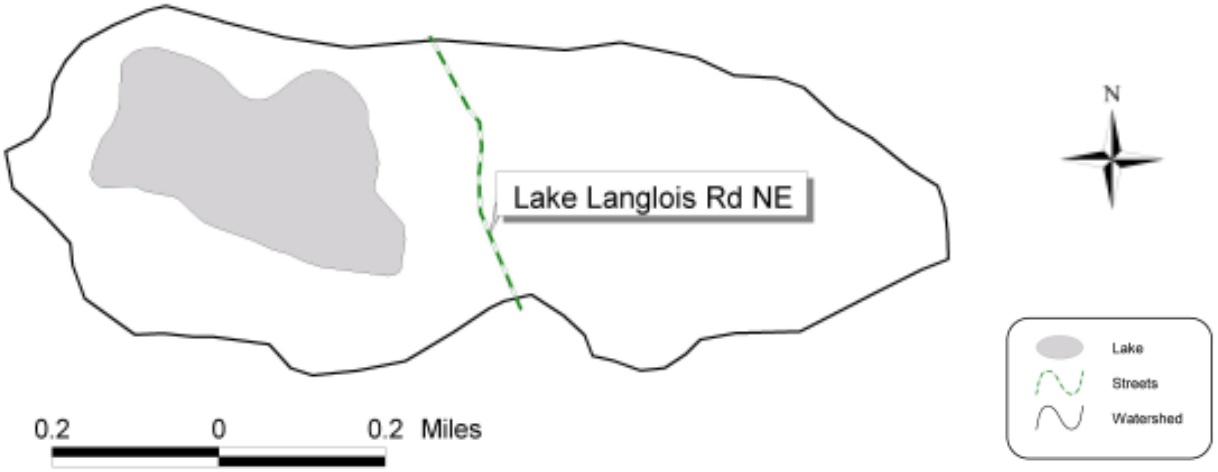


Overview

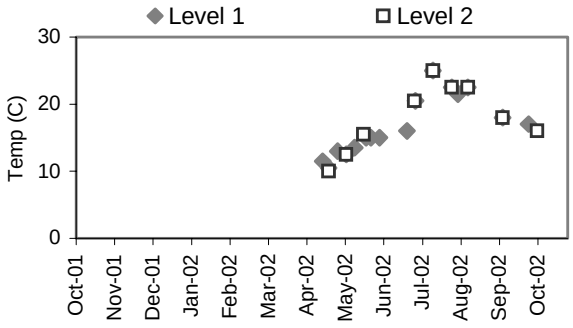
Volunteer monitoring began at Lake Langlois in water year 2001. In 2002 Level II data was collected once, and Level I data was with a winter gap. Since the lake surface makes up 17% of the drainage area, direct precipitation is important, in addition to stormwater runoff and groundwater. Current land use is mixed rural and forestry, with a Girl Scout camp occupying a large portion of the watershed and shoreline.

Lake Langlois has a public access boat launch. Lake users and residents should monitor the shallow areas for Eurasian milfoil, Brazilian elodea and other noxious aquatic weed invaders.

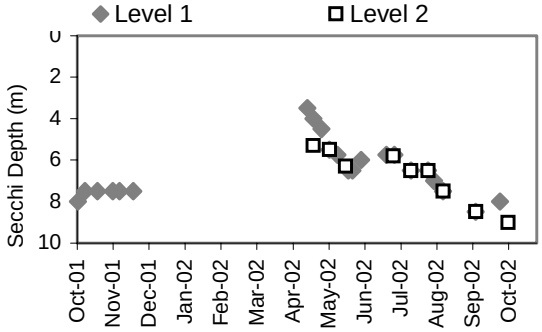
Watershed Map



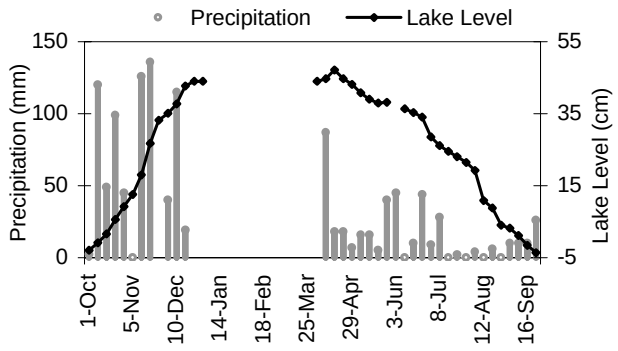
Lake Temperature



Secchi Depth



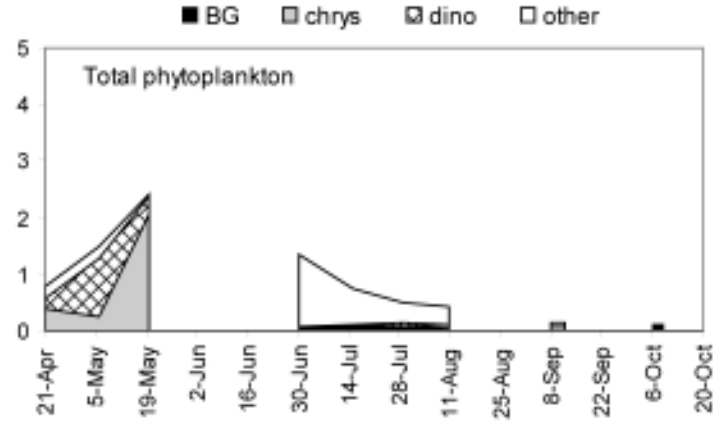
Lake Level and Precipitation



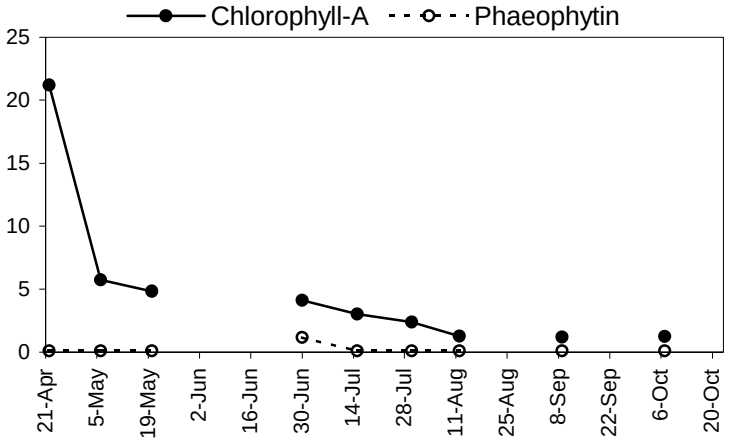
Secchi transparency ranged between 3.5 and 9.0m through the sample season. Water level and precipitation data was incomplete for the year, but suggested a pattern of winter high – summer low stands. Level II surface water temperatures reached 25 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations were low to moderate, with the early season dominated by the chrysophyte diatom *Cyclotella* and an unidentified dinoflagellate. Later samples contained several species of chlorophytes. Chlorophyll content generally followed the phytoplankton volumes, but had its peak value in the first sample of the season.



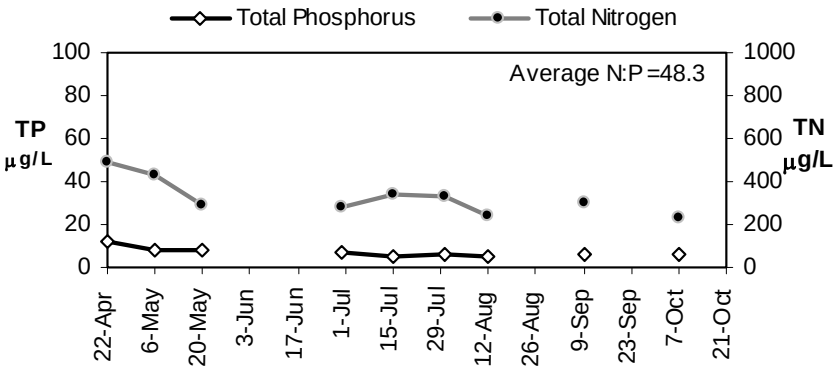
BG = Bluegreen; **chrys** = Chrysophytes;
dino = Dinoflagellates

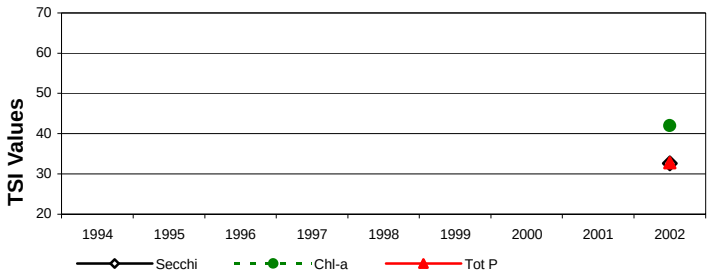


Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in relatively constant proportion to each other through the sampling period. The N:P ratio ranged from 35 to 67.

In 2002, the TSI-Chlor value was above the threshold for mesotrophy, substantially higher than the TSI values for the other two parameters, which were in the lower oligotrophic range.



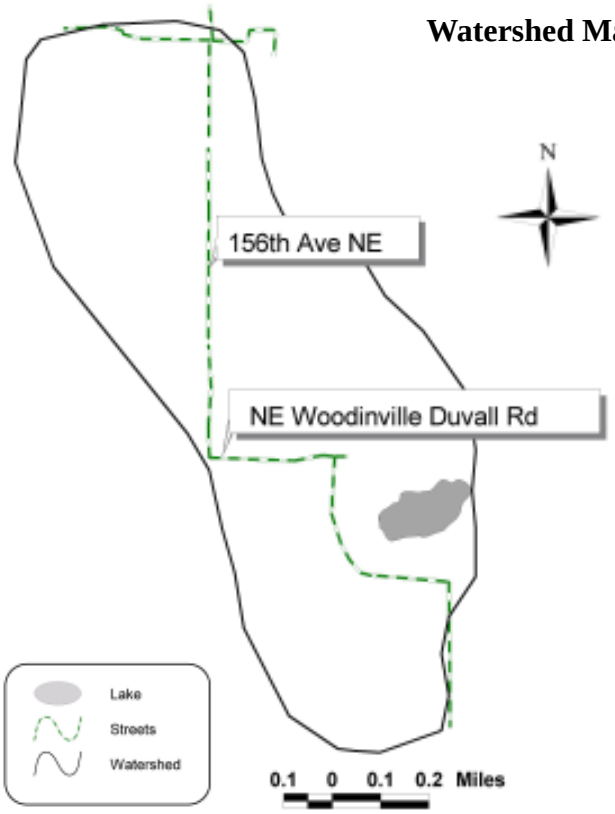


Overview

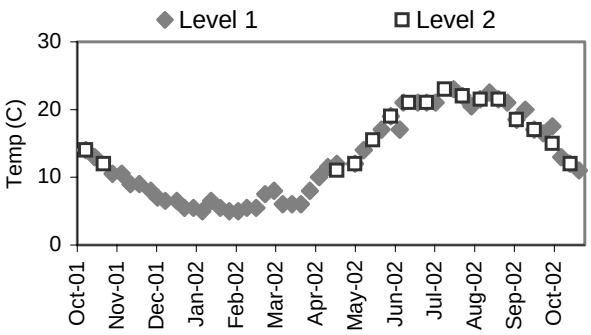
Volunteer monitoring began at Lake Leota in 1998 and continued through 2002. Collected data suggest that this city lake (Woodinville) has been relatively high in primary productivity (borderline eutrophic) with fair water quality. Productivity dropped in 2002, unlike the gradual rise over previous years. Since the lake surface makes up only 2% of the drainage area, direct precipitation is not as important as stormwater runoff and groundwater inputs. There is one class 2 wetland in the basin. Current land use is suburban to urban residential, with one small commercial complex in the catchment.

Lake Leota has no public access points, though residents should keep an eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, Brazilian elodea or other noxious aquatic weeds.

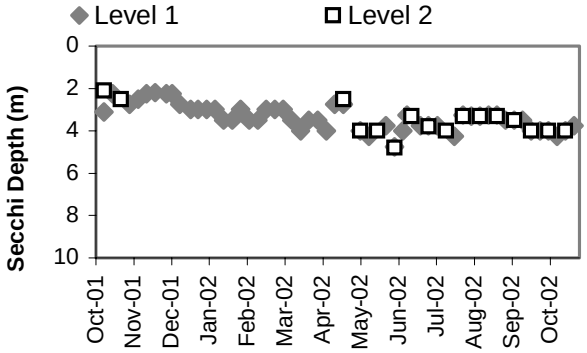
Watershed Map



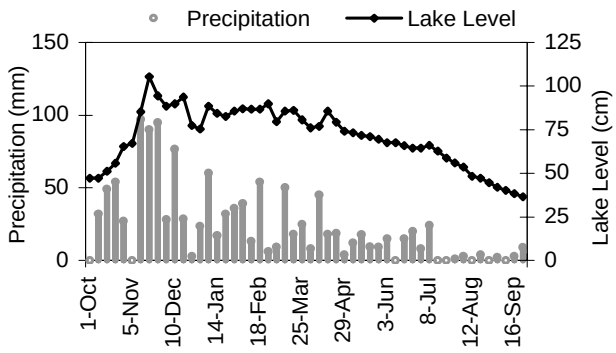
Lake Temperature



Secchi Depth



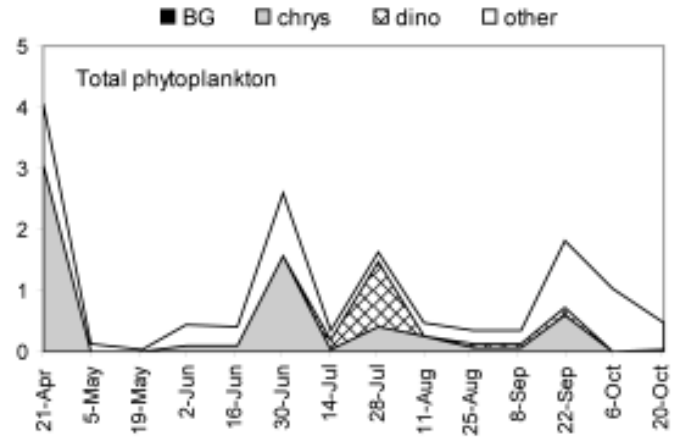
Lake Level and Precipitation



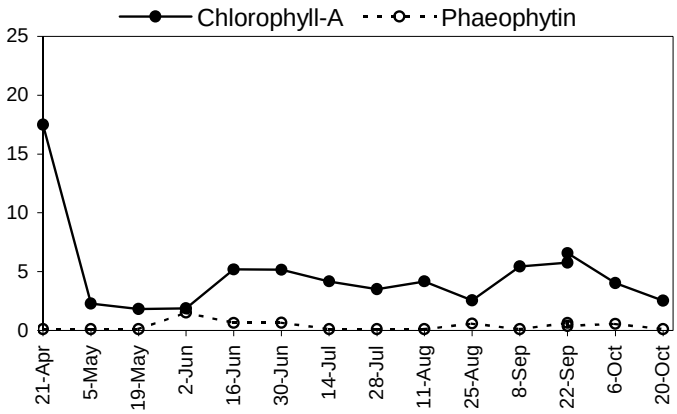
Secchi transparency ranged between 2.1 and 4.8m through the year. Complete water level and precipitation records were compiled for the year. Water levels were relatively stable, dropping slowly through the summer to a low stand in early fall. Annual water temperatures ranged from 5 to 23 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations were low to moderate through the year, with 4 sharp peaks during the sampling season. The first two peaks were both dominated by the chrysophyte *Dinobryon*, the 3rd by the dinoflagellate *Ceratium* ,and the final peak in September by the colonial chlorophyte *Botryococcus*. Chlorophyll content recorded the first peak distinctly, but showed smaller increases with the other three phytoplankton peaks.



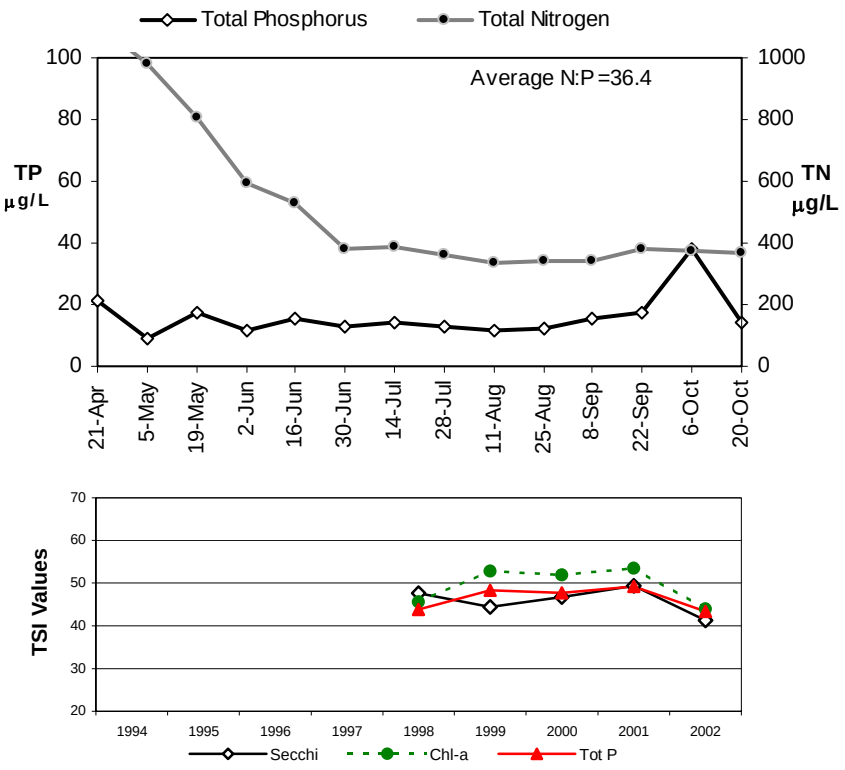
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates



Nutrient Analysis and TSI Ratings

At the beginning of the season, nitrogen was much higher relative to phosphorus, but decreased steadily until the end of June after which they remained in stable proportions to each other, except for one sharp increase in phosphorus in October. The N:P ratio ranged from 10 (October 6th) to 109 (May 5th).

In 2002 the three TSI values were close to each other in the lower mesotrophic range.

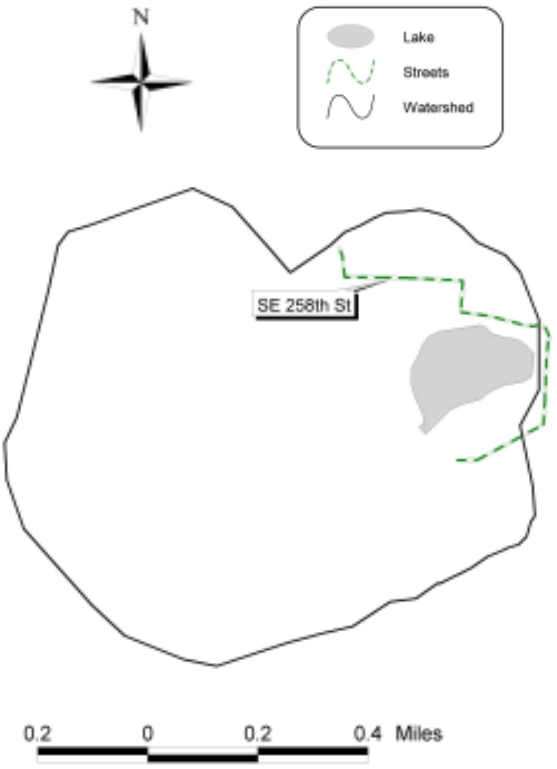


Overview

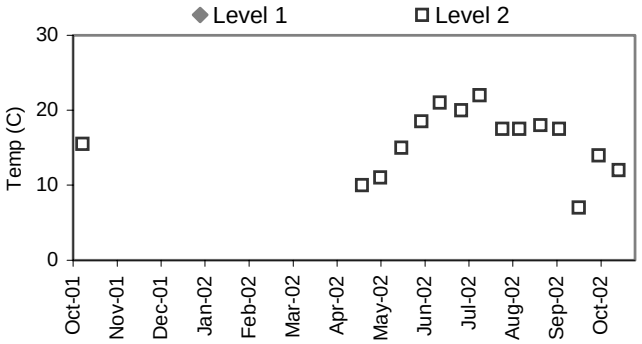
Volunteer monitoring began at Lake Lucerne in the 1980s and continued through 2002, with a four-year hiatus in the early 1990s. The data collected suggest that this city lake (Maple Valley) is relatively low in primary productivity (oligotrophic to mesotrophic) with good to excellent water quality. Since the lake surface makes up 4% of the drainage area, direct precipitation is not as important as stormwater runoff and groundwater inputs. It shares water with Pipe Lake through a shallow channel, and the outlet stream from both lakes exits from Lucerne. There is one class 4 wetland in the basin. Current land use is suburban to urban residential.

Lake Lucerne has no public access boat launch, but has a history of both milfoil and *Hydrilla* infestations, for which eradication efforts have been funded by Washington State Dept. of Ecology, Maple Valley and Covington since 1995. Residents should keep a close eye on aquatic plants growing nearshore to catch new or expanding patches of these and other noxious weeds.

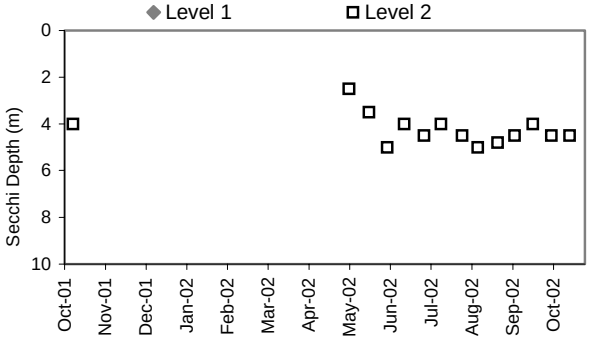
Watershed Map



Lake Temperature



Secchi Depth



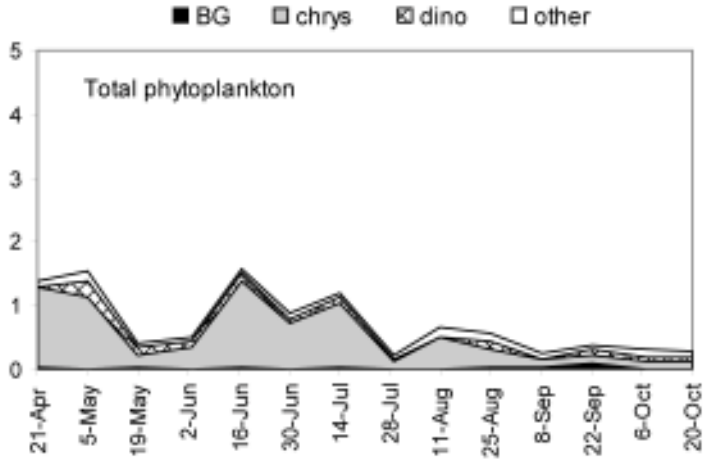
Lake Level and Precipitation

No Data Available

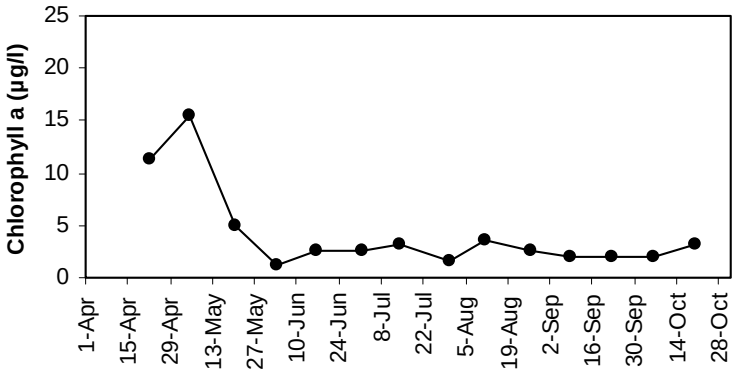
Secchi transparency ranged between 2.5 and 5.0m through the sample season. There were no precipitation or water level records, but records for Pipe Lake should be very similar. Level II surface water temperatures reached 22 degrees Celsius in August.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

Phytoplankton populations were small, dominated by the chrysophyte diatoms *Tabellaria* and *Cyclotella*, as well as the chrysophyte *Dinobryon*. There were more algae in the first half of the sampling period than in the later months.. Chlorophyll content generally followed the phytoplankton volumes through the sample season.



BG = Bluegreen; **chrys** = Chrysophytes;
dino = Dinoflagellates



Nutrient Analysis and TSI Ratings

Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period. The N:P ratio ranged from 33 to 69.

In 2002 the three TSI values were slightly spread out in the upper range of oligotrophy. Total P was the lowest of the three, similar to recent years.